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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

GENERAL DESCRIPTION OF VIRGINA.

From the Encyclopedia Americana.

Virginia, one of the thirteen original states of the American Union, is situated between 36° 31' and 40° 39' N. lat. and 60° 35' W. and 1° 48' E. lon. from Washington city. It is bounded on the north and north-east by Pennsylvania and Maryland, east by Maryland and the Atlantic, south by North Carolina and Tennessee, and west by Kentucky and the Ohio river, or state of Ohio. According to Mr. Boyes's map, published by state authority, its mean length, from east to west, is 355 miles; its mean breadth, from north to south, 185 miles; and its horizontal area, 65,624 square miles.

Civil Divisions, &c. The state is divided into one hundred and ten counties, whereof sixty-five are situated on the east, and forty-five on the west of the Blue Ridge mountains. Adopting the classification under the new constitution, these two great sections may be further subdivided into, 1, the district extending from the sea-coast to the head of tide-water, comprehending thirty-six counties and three towns entitled to representation, to wit, Accomack, &c. 2. The territory stretching from the head of tide-water to the Blue Ridge, containing twenty-nine counties, Albemarle, &c. 3. The valley district, embracing fifteen counties, between the Blue Ridge and Alleghany, Augusta, &c. 4. The trans-Alleghany counties, thirty in number, viz. Brooke, &c. The principal towns are Richmond, the seat of government, delightfully situated at the falls of James river, containing 16,000 inhabitants; Norfolk, on Elizabeth river, which flows into Hampton roads, population in 1830, 9816; Petersburg and Fredericksburg, at the falls of the Appomattox and Rappahannock rivers, the first containing 8300, and the last 3400 inhabitants; Lynchburg, on James river, 120 miles above the falls, population 4157; and Wheeling, on the Ohio, which, though only the fourth in size and population, containing 5000 inhabitants, is, perhaps, the most flourishing town in the state. Besides these, Winchester, Shepherdstown, Martinsburg, Staunton, Lexington and Fincastle, in the valley, and Charlestown and Abingdon, in the trans-Alleghany district, deserve to be noticed. Williamsburg, in the eastern section, and the ancient seat of government, is on the decline; but Charlottesville, where the state university is situated, has rapidly improved within a few years. The principal rivers flowing into the Chesapeake bay are the Potomac, Rappahannock, York and James, all of which are large and navigable. The Shenandoah traces its quiet course down the valley, at the base of the Blue Ridge, and unites with the Potomac at Harper's Ferry. The Roanoke rises in the mountains, and passing into North Carolina, empties its waters into Albemarle sound; and the Great Kanawha and Monongahela are both tributaries to the Ohio. Besides these, there are numerous streams which intersect the country in every direction, and which render it inferior to few in the facilities of water communication. The Chesapeake bay, one of the finest on the continent, extends 190 miles, from its entrance, through the states of Virginia and Maryland. It is from seven to twenty miles broad, and generally nine fathoms deep.

Face of the country.—The mountains of this state commence about 180 miles from the sea-coast, and run nearly parallel with it, in a south-west direction, disposed in ridges one behind another. The first continuous chain, derives, from its deep blue color, the name by which it is distinguished. The north mountains are from twenty to thirty miles farther west; and these are succeeded by the Great Appalachian or Alleghany range, which divides the eastern and western waters, and which Mr. Jefferson calls the spine of the country. The Appalachian system speads into its widest base in Virginia, and, comprehending its various lateral ridges, occupies a superficies of nearly a hundred miles in breadth. The whole of this breadth, however, is not actually covered by mountains, but embraces many picturesque, salubrious and fertile valleys. The highest points of the Blue Ridge are the Peaks of Otter, which are seen at a great distance. One of them is remarkable for its symmetry, being cone-shaped, and terminating in a limestone cube, whose upper surface is barely sufficient to contain a dozen persons. It has been supposed that these beautiful peaks are the highest in the state, computed from the base; but the White Top peak of the Iron mountain, near the North Carolina line, is now believed to be still more elevated. The different portions of the state are strikingly distinguished from each other in their appearance. The tide-water or eastern section, is, in general, low, level, sandy and unproductive, and parts of it exhibit almost as desolate an aspect as the pine barrens of Jersey. Above the falls of the rivers, the outlines of the country are bolder and more picturesque, and the soil, if not generally productive, is in most cases capable of improvement. The alluvial lands, or river and creek bottoms of this section, are very fine; and those of the James river will compare with any in the world for fertility. The valley between the Blue Ridge and Alleghany contains a considerable proportion of mountainous and sterile country; but no part of the commonwealth presents larger tracts of fertile and well-cultivated land. West of the Alleghany, a large part of the country must for ever continue in primitive forest. It is generally mountainous and broken, interspersed with fertile valleys, and occasionally presenting rich bodies of limestone land.

Geology and Mineralogy. Tracing a line from the mouth of Potomac creek, by the Bowling Green, and forks of the Pamunkey, to Richmond, thence through Petersburg and Hicksford to the Roanoke near Weldon, we embrace, between it and the ocean, only tertiary and alluvial formations. These contain oxides of iron, shells and marl, bones of sharks, whales and other fish, carbonated wood, and the remains of vegetables.—Thence to the Blue Ridge, the formation may be

regarded as essentially primitive, and presents most of the rocks of this denomination. Two belts of transition and secondary formation have, however, been found resting on the primitive rocks in this distance. One of these is the sandstone and coal formation of the counties of Goochland, Powhatan and Chesterfield, which is supposed to continue through the state in a direction parallel to its mountains; the other, a narrow seam of limestone, which has been found at the base of the south-west mountain, at various points between the Potomac and James rivers, and which yields, in several places where it has been opened, very beautiful marble. In this primitive region, various ores and metals have been discovered; among them, iron ore in layers and masses, black-lead, copper ore and gold. A formation in which this last metal is frequently found, it is now well ascertained, extends from near Fredericksburg, on the Rappahannock, in a south-west direction, through this and the adjoining states. The dip of the rocks in this region is usually about forty-five degrees. West of the Blue Ridge, the country may be considered as divided by a line sometimes corresponding with the Alleghany mountains, but in the northern part of the state passing east of them, and south of the head waters of the Roanoke, stretching along the summits of the Brushy, Clinch and Garden mountains. East of this line, the primitive rocks appear only at the tops of high ridges and mountains, the intervals between, and slopes of the mountain being generally transition, but sometimes secondary formations. Among the rocks of this region are blue and gray limestone, slate, sandstone, conglomerate or pudding-stone, gypsum and buhr-stone. Iron ore, of the best quality, is extensively distributed in this portion of the state, and valuable lead mines are worked in Wythe county, near Austinville. The dip of the rocks in this district, is generally less than in the primitive, but sometimes rises to forty-five degrees. West of the line above described lies the great secondary formation of the state. The stratification is more or less undulating, but in general nearly horizontal. This portion of the state abounds in mineral wealth. Bituminous coal and iron ore are found almost every where. Beds of limestone are extensively distributed, and the caverns which abound in them furnish large quantities of nitre; and the salt wells of the great Kanawha and the Holston are rivalled only by those of Onondaga, in New York, in the strength of their brine.—Whenever greater facility of access shall be given to this district of country, it may be confidently predicted that no part of the United States will present larger rewards to enterprise and industry.

Mineral waters.—The hydro-sulphurous springs of Virginia have been long celebrated. In no part of the world, perhaps, are they surpassed for efficacy, in most of the cases which result from derangement of the liver, and want of function of this organ and the stomach. They are known by the appellation of the White, Salt and Red Sulphur springs, and are situated, the former in the county of Greenbrier, at the foot of the western slope of the Alleghany, and the two last in the county of Monroe. All of them, particularly the White Sulphur, act, when taken in doses of two or three glasses at a time, as an alterative, exercising on the system much of the salutary influence, without the evil effects, of mercury. Used in larger doses, they become actively diuretic and purgative. The White Sulphur is more remarkable for the former, the Salt Sulphur for the latter property. The Red Sulphur, besides the properties which it has in common with the other two, is remarkable for its action on the pulse, which it reduces considerably in a short time. It is this property which makes it so highly valuable in pulmonary affections. None of these waters, it is believed, have been accurately analyzed. The Sweet springs are situated on Pott's creek (a branch of James river,) about twenty-two miles east of the Salt Sulphur, and seventeen miles south-east of the White Sulphur spring. They are of the class of waters called *acidulous*, and are valuable as a tonic in cases of debility, and in all the varieties of dysepsia which are unaccompanied by inflammation. Their temperature is about seventy-three degrees. In the same range of mountains between which the Sweet springs are situated, and from thirty-five to forty miles north-north-east, are the thermal waters, known by the name of the Warm and Hot springs. The bath of the former has a temperature of about ninety-six degrees, the latter about one hundred and twelve degrees. If the hydro-sulphurous waters above described are valuable in hepatic affections and dyspepsia, the Warm and Hot baths are not less so in rheumatic and cutaneous cases. Doctor Bell, in describing these springs, observes: "All that has been performed by the Bristol, Buxton and Bath waters of England, may be safely claimed as of easy fulfilment by the use of the Virginia waters just enumerated. If to these springs, the Sweet, the Warm and the Hot, be added the White Sulphur, the Salt Sulphur and the Red Sulphur, we can safely challenge any district of country of the same extent in the world as that in which these springs are situated, to produce the same number and variety, whether we have regard to their mineral impregnation or temperature; or the use of which shall be attended with more speedy, entire and permanent relief from a host of most distressing maladies." Besides the above mineral waters, there are others, of more or less value, in different parts of Virginia. The springs at Bath, in Berkeley county, have similar properties, with a temperature somewhat higher than the Sweet springs. In Botetourt, Montgomery and Augusta, are also hydro-sulphurous waters, similar in character to the Sulphur springs of Greenbrier and Monroe, but of less efficacy.

Scenery and Natural Curiosities. The scenery of Virginia is in general highly picturesque.—Without possessing the combination of highland and water prospect, which gives such a charm to the shores of the Hudson, or the soft lake scenery of the interior of New York, she, perhaps, surpasses even that picturesque state in the beauty of her valleys and the grandeur of her mountains. The James river valley offers, at many points, in the bold outline of its hills, and its broad and fertile lowlands, images which remind the traveller of the rich scenery of the Loire and the Garonne; and the mountains of the state are strikingly distinguished, not only by an ever-varying succession of hill and vale, but by the beauty of their covering, their cheerful growth of oak, chestnut and lynn, contrasting advantageously with that of the mountainous districts of the northern and eastern states. The curiosities of Virginia form, to the

traveller, objects of still more interest than its scenery. Among them may be enumerated the passage of the Potomac through the Blue ridge, so happily described by Mr. Jefferson, and that of the James river through the same mountain; the cliffs of New river, which present, for a distance of twenty miles, a succession of sublime scenery, rivalled, in our country, only by that of the Niagara, between the falls and Queenstown; the celebrated Natural Bridge, "the most sublime of nature's works;" the Warm and Hot springs, noticed under the preceding head; the Burning springs of Kanawha, and the extensive and beautiful caverns in the limestone districts of the state, Among these last is one of surpassing interest and beauty: it is denominated Weyer's cave, from its discoverer, and is situated in the county of Augusta, near the little village of Port Republic. The description given by Goldsmith of the grotto of Antiparos, seems almost literally to apply to this interesting work of nature, which presents, for a distance of half a mile, a series of apartments, some of them of great extent and majestic height, incrusted with crystals, and glittering with the most beautiful stalactites. We feel, in traversing them, as if we were visiting one of those enchanted palaces, in which the knights of chivalry were spell-bound, or gazing on one of the scenes so vividly portrayed in the Arabian tales. A cave on Jackson's river, near Covington, is said to be much more extensive and intricate, though perhaps not so beautiful, as that just mentioned.—There is also a natural bridge in the south-west part of the state, which bears no comparison, in grace of proportion, or grandeur of effect, to the one in Rockbridge. In Hampshire county there is an ice mountain, which is very remarkable. On its north-west side, the surface is covered by loose rocks, which being removed to the depth of about three feet presents an abundance of ice at all seasons of the year. The most noted cataract in the state is that of the falling spring, in the county of Alleghany. The stream is of sufficient volume, a few yards from its source, to turn a mill-wheel; and about a mile below it has a perpendicular descent of 200 feet, down a precipice of calcareous rock. Before it reaches the bottom, it is almost converted into vapor, and the temperature is much reduced. The stream unites with Jackson's river, about two miles below the cataract. The lake in Giles county not having been embraced in any written account of the state, deserves to be noticed. It presents the curious spectacle of a beautiful sheet of water, a mile and a half in circumference, and a hundred fathoms deep, on the summit of a lofty mountain. Some of the aged people in the neighborhood remember when its bottom was a spot of marshy ground, covered with oak and pine, and much frequented by deer and elk, in pursuit, as was supposed, of salt. In process of time, a small pond was formed in the centre, increasing slowly at first, until a stream, which had its source high in the mountain, suddenly ceased to flow. Afterwards, the lake rose rapidly, and, covering the highest trees, finally ascended to the mountain top, where it overflows at a single point below the general level. The water is not saline, as is generally supposed, but pure and potable. It abounds in lizards, but no fish have been discovered. The idea which prevails of its alternate rise and fall is erroneous. This lake is 3700 feet above the level of the ocean. Lake Drummond, in the Dismal Swamp, is about seven miles in extent, and about twenty-four feet above tide-water. Its waters are cool, strongly tinged with juniper, and pleasant and wholesome to drink. If our limits allowed, the ebbing and flowing springs of Washington county, and Cow-pasture valley, the carved or calico rock of Kanawha, and various other curiosities in the state, would merit particular description.

Internal improvements. The Virginians are said to be privileged to have bad roads. Supposing such a privilege to exist, they have certainly availed themselves of it largely. In none of the Atlantic states, in proportion to their extent and population, has so little been done to improve the common highways of the country. To improvements of a higher class, the people and their public agents have not been indifferent. Two highly valuable canals have been constructed, and are now in successful operation. One of these, the Dismal Swamp Canal, is twenty-two and a half miles long by sixty feet wide, and seven feet deep, and connects the navigable waters of the Chesapeake bay with those of Albemarle sound. The other, the James river canal, extends from Richmond, about thirty miles up the James river valley. This work is among the best executed of our country, and will probably be extended, in a few years, to Lynchburg, and perhaps to the foot of the Alleghany, whence a rail-road of 140 miles in length would connect the canal with steam-boat navigation on the Kenawha. Besides these, there are several other canals of less extent. Among them are the Blue Ridge canal, about seven miles long and thirty feet wide, overcoming a fall of one hundred feet in the river; the Roanoke canal, a work of the same extent, around the falls of the Roanoke; and the Appomattox and Rappahannock canals, similar works near Petersburg and Fredericksburg. Rail-roads, though of but late introduction in the United States, have attracted considerable attention in Virginia. One of these has been lately executed near Richmond, the results of which are more brilliant, in proportion to its extent, than those of any similar work in the union. It is about thirteen miles long, and connects the coal mines of Chesterfield with tide-water. The whole capital invested in it, including cars for transportation, stables and horses, was $150.000. The trade on it is already fifty thousand tons per annum, and the receipts for transportation during the present year will, it is understood, be about $70,000. The stock is, of course, largely above par. A second rail-road, of greater extent, is now in active progress between Petersburg and the Roanoke. It will be sixty miles long, and will connect, when completed, the Roanoke navigation with the town of Petersburg.—The first thirty-five miles of this improvement will be in operation in the course of the present year, (1832) and the whole work will be completed by the beginning of 1834. Other rail-roads are proposed, and will probably soon be executed. In 1816, the legislature created a "fund for internal improvement," the capital of which, in 1831, amounted to $1.500,000, and the revenue of the year to about $90,000. Out of the annual income, the state contributes, in aid of valuable improvements, two-fifths of the capital stock, leaving the residue to individual subscription. The great

line of improvement between James river and Kanawha has been managed exclusively by state authority since 1820; but the last general assembly (1831-2) incorporated a joint-stock company, with a capital of $5,000,000 (the state taking two-fifths,) and gave it ample powers to establish a more perfect communication, by continued canals and rail-ways, between the waters of the James and the Ohio. If the scheme should be successful, its influence upon the future destinies of the state will be incalculable. But it would lengthen this article too far to point out the many natural advantages of Virginia, and her many facilities for developing them. It seems to be always the wise economy of nature to leave something to be effected by the industry and enterprise of man.—When these shall have developed, to their full extent, the resources of this state, it may be confidently anticipated that she will rival the most flourishing of her sisters in wealth and prosperity.

Agriculture, Manufactures, &c. The agriculture of this state is various, but, for the most part, badly conducted. The old practice of clearing and cultivating land every year until exhausted, then turning it out to recover from its own resources, still continues in many places. In others, the *three-shift* system prevails; that is, 1, a crop of Indian corn; 2, wheat, rye or oats; 3, the year of *rest*, as it is called, in which the spontaneous vegetation furnishes a scanty subsistence to stock; after which the soil is again subjected to the scourging process of cropping, while little attention is paid to the application of manures, or the culture of artificial grasses. This destructive system, for the most part, prevails from the sea-board to the head of tide water, and on the south side of James river as far as the Blue Ridge. On the north side of that river, cultivation is better, particularly in the counties approaching the Potomac. Rotations of crops are attended to; grass-seeds, most commonly red clover (*trifolium pratense*) are sown on the small grain; and animal and vegetable manures are saved with care, and judiciously applied.—Gypsum is also used, and with powerful effect. In the valley district, agriculture is also well conducted; and irrigated meadows are abundant and productive. On both sides of the Blue ridge, maize, or Indian corn, wheat, rye, oats and buck-wheat are the principal grain crops. Tobacco is extensively cultivated in eastern Virginia, but sparingly in the valley, and that chiefly in its southern portion. The grass-seeds common to both regions are red clover (*trifolium pratense,*) orchard grass (*dactylis glomerata,*) timothy (*phleum pratense*) and herd-grass (*alopecurus pratensis,*) the two former on dry, the latter on moist soils. In the eastern and southern districts, cotton is planted to some extent. On the shores of the Chesapeake, barley and the castor oil bean (*ricinus communis*) are cultivated; and, on some of the best lands above tide-water, hemp is raised to advantage. The trans-Alleghany country, being exceedingly mountainous and remote from market, is chiefly devoted to the raising of live stock.—Very little more grain is raised than is necessary to supply the country itself, and the travellers and stock-drovers who pass through it. The climate and soil being favorable, the pastures are excellent. The greensward (*poa viridis*) and white clover (*trifolium repens*) spring up spontaneously wherever the timber is removed or deadened, and, on rich ground, are very luxuriant. Of the profits of agriculture in Virginia, it is difficult to speak with precision. In very many instances, it yields a bare subsistence to the cultivator; in others, a net income of two or three per cent.—But, where the land is in good heart, the convertible husbandry practised, and wheat and tobacco are the chief products, there is no doubt that, with slave labor, a profit of from six to eight per cent. may be annually derived from the capital invested. For this result, however, great activity and attention are necessary on the part of the owner.—Lands in the valley, where there are comparatively few slaves, sell higher than on the eastern side of the Blue Ridge; and the general appearance of the country is more prosperous, although the soil is, for the most part, inferior; the climate decidedly so; running streams less frequent; and communication with markets more difficult and expensive. In 1831, according to official returns, 44,529 hogsheads of tobacco were delivered from the several warehouses in the state for export and manufacture; and, during the year which ended in June, 1832, upwards of 544,000 barrels of flour passed the various inspections. The quantity of flour inspected is, however, a very uncertain index to the total product. Some of the Virginia flour, and especially the Richmond brand, has acquired great celebrity in South America and elsewhere. Most of the vegetable productions found in the Middle and some of the Southern States are common also to Virginia. West of the Alleghany, the sugar maple grows in abundance. There are some excellent native grapes, the culture of which will claim greater attention, since the winters have been found too severe for the foreign vine. Few countries possess greater facilities for manufacturing; the raw material of almost every kind, labor sufficiently cheap and abundant, inexhaustible supplies of fuel, and water power without limit. Yet, with all these advantages, planting and farming will long be the favorite pursuits. In the northern and north-western parts of the state, and in some of the principal towns, valuable manufactories are established of cotton and woollen cloths, glass, iron, &c. The Kanawha salt-works produce annually about 1,000,000 bushels, and those of the Holston about 100,000.

Climate. In a country of such great extent, and of so uneven a surface, there is, of course, great diversity of climate. It is believed that few meteorological observations have been made, either at public seminaries or by private citizens. The diary of an intelligent gentleman at Richmond exhibits the following table of mean temperature for the years stated. His later observations are incomplete.

Average Temperature in	Morning.	Noon.	Night.
1824, - - - - - -	49 5-6	65	55
1825, - - - - - -	48 1/3	64 2/3	54 2/3
1826, - - - - - -	48 1/2	65	54
1827, - - - - - -	50 1-6	65	55

This table exhibits a striking approximation in the results of each year. The monthly calculations upon which it is founded, if compared with five years observations made by Mr. Jefferson at Williamsburg, from 1772 to 1777, will authorize the conclusion that the climate of lower Virginia has undergone a considerable change in the last

half century. According to Mr. Jefferson, the average daily range of the thermometer, in the five years mentioned, did not exceed from 5° to 7°; whereas, from 1824 to 1827 inclusive, the average variation was 16°. Richmond and Williamsburg are sixty miles distant, and except that the latter is nearer the ocean, and within the influence of its breeze, the difference in temperature must be inconsiderable. That the climate is much more fluctuating than formerly accords with the experience of most persons advanced in years. The changes are more sudden and violent: the heats of summer, especially in latter years, are more intense, and the winter cold more severe for short periods. The spring is exceedingly inconstant; but the latter part of autumn, particularly in the upper country, is a fine and delightful season. The *Indian summer*, which seldom fails to occur late in the fall, or in early winter, is distinguished by a golden haze, and most agreeable temperature.

Population.—By the census of 1830, the free white population amounted to - 694,300
Free colored - - - - 47,348
Slaves - - - - 469,757

Total 1,211,405

In 1800, the free whites numbered 514,280
Free colored - - - 20,124
Slaves - - - 345,796 880,200

Increase in thirty years, - - 331,205

Or thirty-seven and a half per cent.

In the same period, the free whites increased 180.020, or 35 per cent.; the free colored persons 27,224, or 135 per cent.; and the slaves, 123,961, or 36 per cent. For the ten years preceding the census of 1830, the rate of increase of the whole population diminished considerably, and the relative increase of the several classes varied from the foregoing results. On the whole population, the rate was reduced from 37½ to 13½ per cent.; on the free white, from 35 to 15 per cent.; on the free colored, from 135 to 28¼ per cent.; and on the slaves from 36 to 10½ per cent. It is to be observed, however, that, while the black population of the whole state has been diminishing, when compared with the white, the reverse is true in respect to eastern Virginia, which is peculiarly the slave region; for while, in 1790, there was in that district a majority of 25,000 whites, the slave and free colored population out-numbered them at every successive census, until, in 1830, the excess was upwards of 81,000. The facts thus exhibited show that western Virginia, which contains comparatively few slaves, has rapidly increased its white population in the last ten years, the rate of increase amounting to 25 per cent.; while, on the eastern side of the mountains, the increase of the whites, in the same period, did not exceed 7½ per cent. The greater multiplication of blacks in eastern Virginia, notwithstanding constant deportation to the southern and south-western states, may be partly ascribed to the mild treatment which they generally receive from their owners. On the other hand, the evil effects of slavery, and the policy of adopting some scheme for gradual abolition, are topics which have been freely and earnestly discussed, and have already arrayed the Virginians into two powerful parties. The slow progress of the white population, compared with some of the other states, when so many propitious causes exist for its advancement, has been urged as a prominent objection to slavery. Indeed, the march of its aggregate population has fallen far short of the predictions of former times. Mr. Jefferson, in his Notes, which were written in 1782, estimated that the then existing stock, unaided by foreign emigration, would be multiplied to 2,270,000 by the year 1835, exceeding, by upwards of a million, the result of the last census. That the increase of numbers has been restrained by powerful checks seems reasonable; but to point out their true character and operation, belongs rather to the department of moral and political philosophy.*

For the Farmers' Register.

DISCOVERY OF MARL IN A NEW DISTRICT.

"Lime is the basis of every agricultural improvement."
Baron Hepburn's Survey of East Lothian.

Mankind have, in all ages and countries, been prone to seek deliverance from the curse originally inflicted on the race, that they should live by the sweat of their brow. This propensity often leads us to seize with avidity any scheme, however wild, which has the charm of novelty, and promises great results, from little effort. It subjects us, in every department of life, to the vilest tricks of the vilest impostors.

The wisdom paid for by experience, often at an enormous price, may, sometimes, remedy the direct evils resulting from this principle. But there are others growing out of an antagonist propensity, affecting the interests and prosperity of the community, perhaps, still more seriously.—Having suffered ourselves, or having seen others suffer severely, by hastily adopting novel plans of improvement, which had nothing to recommend them, but the extravagant praises of their propagators, we sometimes become prejudiced against every change in conducting the concerns of life, and obstinately persist in old practices, merely because they have been *tried*, although daily witnessing and acknowledging their defects, rather than expose ourselves to ridicule for failure in an untried course.

The foregoing remarks should not be applied to the district for which this article is particularly intended, but with much qualification and allowance. The agriculturists of middle Virginia are generally intelligent and enterprising. They see and deplore their peculiar obstacles to improvement. Their efforts have, in a great measure, been thwarted or controlled by the privations of nature, or the still more galling and intolerable, because unjust, oppressive and relentless regulations of man. From

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*☞It is peculiarly suitable to the plan of our publication to present a general description of Virginia, as introductory to the many references that will be made to different regions and particular localities, and to the agricultural reports on farms, or on counties, for which we hope to be obliged to some of our correspondents. This object could not have been better attained than by offering to our readers the foregoing *extract* from the excellent article on Virginia in the Encyclopædia Americana. It is attributed to the pen of a Virginian who is distinguished for literary taste and acquirements. We shall be much pleased to obtain directly from the same source, the valuable aid which it can so well give to our pages.—[*Ed. Far. Reg.*

the forced introduction of the African laborer, to the present day, we have felt the influence of governmental interference in the regulation of *domestic industry;* and we are still—ungrateful for the paternal interposition.

After yielding to gloomy forebodings in relation to the agriculture of his native land, so as, sometimes, almost to be driven to the painful alternative of emigration—to his feelings, nearly synonymous with expatriation—the writer thinks he can perceive brighter prospects before us. These hopes have, in a great measure, been excited by the perusal of "An Essay on Calcareous Manures," by Mr. Ruffin, of Prince George. The publication of this work, it is believed, will form a most important era in the agricultural history of the state. No man can understandingly read the book without perceiving the pleasing opportunity afforded the inhabitants of the tide-water country, of renovating their exhausted fields, and many of our agricultural brethren beyond the mountains, of almost indefinitely enriching their already fertile soil. The great value of lime, as a manure, has long been known in Europe, and indeed, the true secret of the surprisingly large crops of which we sometimes read, seems to consists in its use. It was reserved for Mr. Ruffin to point out, for some parts of our own country, exhaustless stores of this kind of manure, and to digest and develope a theory of its operation, which, it is believed, will hardly be controverted.

It has been commonly supposed, that calcareous matters to any valuable extent, were denied to that part of Virginia between tide-water and the mountains. The writer of this article having recently discovered considerably extensive beds of clay marl on his own land, and perceived the indications of it on the lands of others, feels impelled, however diffidently, to make a communication to the public, of the very small degree of information, as yet acquired on the subject by himself. He has known from his childhood that there were very numerous pebbly concretions issuing from the clay in the gullies, and the crevices and fissures of the rocks, possessing the qualities of lime, inasmuch as they made a good cement for plastering, and would be rendered caustic by burning. But of these there were not enough to be valuable in the purposes of masonry, and of marl, the writer knew scarcely more than could be learned by the definition in a dictionary—not even knowing that lime was necessarily a constituent. On reading a few pages in Mr. Ruffin's book, he began to suspect that the clay in which those calcareous pebbles were found was itself calcareous, and a very slight examination confirmed the suspicion.

Primary formations sometimes furnish ledges of magnesian limestone. Lime and its combinations, as the writer believes, are generally found in lands that are of secondary formation, that is, lands which have at some time formed the beds of seas or lakes, or undergone some radical change of structure since the creation. And this it is believed is the chief source whence lime is obtained. A stripe or vein of land of secondary formation, passes through Prince Edward county, from north to south, containing small veins of pit coal, coal slate, freestone, whinstone, large strata of sandstone, occasionally slightly calcareous, and other substances usually found in such lands. Many of the strata of rock are impregnated with common salt, Epsom salt, and other saline matters. There are occasionally to be found very minute seams or veins of selenite (crystallized gypsum,) though, as yet, none have been discovered large enough to become important in agriculture. It is highly probable, however, that those rocks which have this substance deposited in their crevices, are, throughout, more or less impregnated with it.

As to the extent of this kind of land, the writer possesses no exact knowledge. His personal observation of it extends from a few miles to the north-east of Willis's mountain in Buckingham, almost to the Roanoke in Mecklenburg. It is said to go many miles into North Carolina, crossing the river Hyco. But neither its southern or northern termination are known to the writer. In width it varies very much in different neighborhoods; in some places being eight or ten miles wide, and in others very narrow, or even apparently swallowed up in the hills of primary formation. A stranger travelling from Raine's tavern to Farmville, would, on looking westwardly from some points on the road, suppose himself in the vicinity of a vast river, from the depression of this land below the adjacent country. This kind of land is in that neighborhood, of very considerable width, where it has long borne the name of the clover forest country, from its propensity to produce, in wet summers, a species of annual clover, called the buffalo, of a beautiful and luxuriant growth. The seed of this clover, like those of cheat and many other plants, require much moisture, at a particular juncture, to excite them to vegetation, so that the crop is but seldom seen.

For many miles on the south side of the Appomattox, this stripe of land contracts to a much narrower space. It has been long since the writer was in the eastern end of Charlotte or the western end of Mecklenburg. But he is inclined to believe, from his recollection of the country, that, in those parts, this kind of land is very broad. It is generally accompanied by a very bold stratum of black rock, particularly striking whenever the writer has been able to trace it.

The character of the soil, generally, in this vein of land, has not stood high. The subsoil being commonly what is called pipe clay, it is very wet in winter, so much so, that in some parts roads could scarcely be made without the aid of extraneous materials. The soil, however, is more favorable to the production of grass than that of the adjacent lands of primary formation, and when apparently exhausted, more speedily furnishes materials for its own resuscitation.

The existence of lands half way between tide-water and the mountains, capable of furnishing calcareous manures, is a fact novel and unexpected—this being a locality as little likely to enjoy such an advantage, as any in the state. So that some ground is afforded for inferring that there may be other similar stripes of land, intersecting the state in such a manner as to afford the means for furnishing a sufficient supply of this best of all manures to all that portion of the state most needing it, whenever the facilities for transportation, by improving the navigation of our streams and constructing rail-roads, shall have been sufficiently afforded. In reply to the question, how some parts of Scotland could have been so surprisingly improved within a few years, an old farmer of that

country observed, that they owed it all to good roads and lime.

There can be little doubt, but that all that section so abundantly furnishing coal, in Goochland, in the lower end of Powhatan, and in Chesterfield, contains also bountiful supplies of marl. We could also expect to find it in the level swampy country to the south and south-west of Manchester.

In countries where this kind of manure has been fairly tried, there would be little need of urging its importance. Scotland, some thirty or forty years ago, was remarkable for the sterility of its soil, for the poverty of its inhabitants, and the scarcity of the means of subsistence. In agricultural skill and prosperity, and the high rate at which its lands are rented, it now stands, if not before all other countries in the world, at least in the foremost rank. All the agricultural writers of that country, ascribe to the instrumentality of lime the chief agency in effecting this change. In our own state, until very recently, but little attention has been paid to this subject. Our forefathers having an abundance of virgin soil before them, thought little of troubling themselves about manures of any sort. Instead of lending to the earth, with a view of drawing interest, we have been lavishly squandering the principal. And after the stock was nearly exhausted, we have found putrescent manures too unattainable in sufficient quantities, and too transient in their effects, to restore to the soil its pristine vigor. In some states of disease, diffusible stimulants serve, perhaps, only to burn out more hastily the remnants of vitality. The patient needs something permanent—tonics, which will produce a constitutional change, and afford scope for the action of stimulants. In this light, lime, as a manure, may be viewed. It is a necessary ingredient in the constitution of every good soil —a constituent in the formation of every vegetable, and we believe that scarcely a single plant could be brought to maturity if entirely deprived of its agency.

It is the common opinion of our geologists, that all the strata of rocks in this district of country, which pursue an extensive range, observe a course parallel to that of the Blue Ridge mountains. This opinion is, in the main, correct. The ledge of black rock, however, of which we have spoken above, so far as it has been traced, continues in about a due north and south direction, intersecting the general range of strata, at about an angle of forty-five degrees. This may readily be perceived from its outrunnings, which appear above ground, for a distance of more than fifteen miles; from the lands of the late John W. Eppes, Esq. of Buckingham, to several miles south of Prince Edward Courthouse. This we believe to be the case with others of the ledges of round black rock, which occasionally traverse the country. They appear to form braces, intersecting the ledges, which run north-east and south-west. The stripe of secondary land, of which we have been treating, seems generally to stretch from north to south, but the strata of rocks imbedded in it go north-east and south-west, and dip towards the north-west, at right angles to their course. The outrunnings of ledges which may be observed on the western side of this stripe of land, though interrupted by it for some distance, may be found again on the eastern side of it, preserving the same course, and having the same accompaniments.— We thought it might not be amiss to record these observations, though entirely unconnected with our subject.

The writer felt bound to furnish to the public information which circumstances threw in his way, however imperfectly he has performed the task; because, he hoped it might cause others, better qualified, to investigate this important subject.— To be placed before the public in this way, to him, is a novel and unpleasant predicament. But if he can thus excite those living in the same range of land with himself, or persons elsewhere, enjoying the same advantage, to attend to the subject of marl, he will consider himself highly rewarded.

It only remains for him to state that he has no experience of the benefits of marling, having but recently discovered the existence of marl on his land. He has spread about a thousand horse cart loads on about ten acres of land, dropping the loads in squares of twenty feet. Nearly all this land was in the second growth of trees, having long been considered totally exhausted, and very much gullied. He proposes to cultivate a part of this ground in corn and a part in cotton. Should it produce good crops, it may be considered a triumphant proof of the efficacy of marl, as none who view the land now, can be persuaded to augur favorably concerning it.

Our experience in marling suffices to convince us that it is not one of the expedients to become rich without trouble. The operation is both expensive and laborious, especially in winter, on a wet soil and rotten substratum. And even should its avails equal the representations of writers on the subject, they are only to be attained by industry and perseverance, directed by some degree of skill.

W. S. MORTON,

Near Farmville, February 22d, 1833.

To the foregoing important communication, we will take the liberty of adding some extracts from several letters written by Dr. Morton on the same subject, but without any expectation of their being published, and before he suspected that the Farmers' Register would have an existence. The more minute descriptions which these extracts furnish, we are sure will be both interesting and useful to many who reside in the region through which our correspondent supposes this calcareous formation may be found. In the infancy of a discovery which promises to prove so important to an extensive district, the directions to those who desire to pursue the investigation, cannot be too full or minute. We trust that this will serve with Dr. M. to excuse us for thus extracting from his letters: our other patrons will not consider that any apology is required.

December 17th, 1832.

. . . . . .

I presume it will excite in you as much pleasure as surprise, to learn, that in this part of the state, calcareous manures can be found, and, possibly, in considerable abundance. The opinion has obtained currency, that in geological structure a primary formation prevails from the Blue Ridge to the head of tide-water. This is certainly correct in the main. There is, however, at least one slight exception. Having paid but little attention to geology, and been but a very moderate traveller, my information extends not far from home.

A stripe or vein of land extends from near the residence of the late Dr. Hubbard of Buckingham, a few miles to the north-east of Willis's mountain, to the neighborhood of Samuel L. Locket, Esq. on the Roanoke, in Mecklenburg, evidently bearing all the evidences of secondary formation. How much farther it may extend each or either way, I know not. It contains freestone, whin, coal slate, small veins of very fine coal, smooth quarts, river stone, marine and Epsom salts, and many other matters, clearly indicating the secondary character. In some places there are numerous very small and irregular seams of calcareous matter, between the strata, and in the broken crevices of the rock, and occasionally, deposites in the valleys, of calcareous clay, which, I suppose, may fairly come under the denomination of marl.

. . . . . I have known, for many years, that my land contained some modification of lime, and have frequently mended broken plastering about the house, with a cement made of calcareous pebbles found in the gullies. But having a very vague idea of marl, I never thought of seeking for it here, until I fortunately met with your work on calcareous manures. After meeting with this, I made search, and very readily found two deposits, which, I believe, contain lime enough to render them valuable as manure. I have, however, no means of accurately determining their quantity of lime. There are, also, very small veins of a calcareous appearance, containing crystals which I take to be gypsum—and extensive beds, near these, of a very fine clay of a marly appearance, which will not effervesce with muriatic acid, possibly on account of the presence of sulphuric.—One would, on first sight, prefer this, as manure, to the clay, which does effervesce with muriatic acid.

I find the deposits, in every instance, lying under a superstratum of black gravel, and in the gullies above these deposits, it lies in minute seams, between the strata of rocks and in their crevices, from which, in very wet weather, it issues of the color and consistence of cream, and, on drying, forms a very hard cement. Wherever there is an accumulation of clay in the banks of the gullies, about such places, it seems to become marly; I suppose, from the exudation, so often occurring from those seams.

JANUARY 19th, 1833.

The hill-side above my marl-bed is composed of numerous strata of slaty sand-stone and coal state, which I suppose to be slightly calcareous, their innumerable crevices and seams being filled with either chalky concretions, or soft calcareous matter. The water oozing from these strata to the foot of the hill, on coming in contact with pipe clay, is filtered through, and deposits lime. The following fact, I think, confirms this opinion.—About the richest marl I have found, is contained in the site of what was, within my recollection, a gulley of considerable depth, now filled with clay marl; so that, I should judge, the marl is constantly forming in situations suitable for the deposites of lime.

The beds of marl, in so far as I have seen, are covered by beds of black gravel, the gravel having assumed about the same shapes and appearance, except in color, as the calcareous concretions below. From this, I would infer, that the gravel was once calcareous, though now probably chalybeate, and that the lime is constantly sinking, or in some other way wasting.

Lower down, or to the eastward of the marl bed, I find in the crevices and fissures of the rock thin layers of beautiful selenite, the crystals being so delicate that they scarcely can be handled without demolition. In the vicinity, and to the east of this material, there are much fewer of the limy concretions; but a vast deal of rich-looking clay, of very unctuous feel, when wet. Possibly this clay may contain lime, combined with sulphuric acid. About these seams of selenite, much common salt is, in frosty dry weather, perceivable by the senses, and evinced by the propensity of sheep and other stock, to lick the banks. My recollection of chemical affinities does not, at this moment, enable me to say, whether this article would not decompose gypsum in any form.

January 24*th*, 1833.

I have endeavored to send about a fair sample of the marl, by cutting a block of it which would just fit the box, from a good, but, I think, not the best part of the bed. You will observe that the calcareous matter appears to be deposited in the cracks and interstices of the clay, and that there is but little lime in the lumps of clay. The gravelly concretions in the top of the box, I think, are nearly all lime; they are very numerous in the marl bed, and you will doubtless find some of them in the block of marl sent you. They are generally surrounded by loose calcareous matter, whether given off from, or about to be added to them, I know not. This, I suppose, will constitute the chief riches of my bed: as the pebbles are too hard to benefit the soil immediately, and the lumps of clay have but little lime in them. Though much interrupted by wet weather, I have spread five or six acres, aiming to put on about four hundred bushels to the acre. My soil is so wet in winter, that a pit dug, without an outlet, will generally remain full of water. And this winter it has been much wetter than usual. As soon as the earth dries sufficiently, I propose to plough the marled land with small ploughs at first, to avoid burying the marl too deep.

The selenite thus far, is only interesting as a curiosity—as, being found only in irregular seams of slight thickness, the quantity is too small to be important in agriculture. I hope, however, to find a bed of marl containing this material, on the eastern side of my plantation, as it is here that I find the seams of selenite.

My other engagements have prevented my making searches for marl at a distance from home; I have, however, found superficial indications in several places, which look well, but the beds have not been explored.

February 22*d*, 1833.

Not long after I sent you the box of samples, I found another bed, or, perhaps more correctly, a continuation of the same bed, containing, apparently, much richer marl. It is much more friable, and the calcareous matter more intimately blended with the other matters. The extremely wet weather has, however, prevented my making much use of it.

I now suspect that there is a vast deal of marl

in the vein of the country about which I have written so much.

The specimens mentioned above were examined, and the following results obtained.

Of the mass of argillaceous earth, (which formed an unbroken cube of about seven inches,) three several specimens were taken, of near a pound each, and from each of these, after being pounded, smaller portions were again taken for examination. To the eye, it appeared that either was a fair sample of the argillaceous marl. Of these.

No. 1, 100 grs. yielded 9½ of carb. of lime, = 9½ pr. ct.
— 1, 300 — — 28 — — = 9⅓ pr. ct.
— 2, 200 — — 24 — — = 12 pr. ct.
— 3, 400 — — 35 — — = 9¼ pr. c.t

The mass contained several of the hard concretions described by Dr. M. but no portion of them was included in these three samples, nor in any way served to affect the result. Of the concretions alone, a sample formed of three different lumps, yielded 64 hundredth's of carbonate of lime.

The remarkable adhesiveness of the argillaceous earth, made it impossible to separate from it (by washing on a filtering paper,) all the acid used—and of course, all the lime dissolved in the acid, could not be removed. For this reason any mode of examination except that used (the measurement of the carbonic acid gas evolved,) would have given a deceptious result. The same adhesiveness, and its consequences, prevented an examination of the clay marl for gypsum, which may well be supposed present in sufficient quantity to be useful as manure, in conjunction with the more abundant calcareous ingredient. To determine this question, we hope our friend Professor Cushing, who resides near this region, will direct his attention, and report the result of his examination.

The crystals sent were pure sulphate of lime, (selenite, or gypsum.) Two other samples were of mixtures of clay, with very large proportions of these crystals, of small size: but they were not analyzed, as the quantities found were stated to be too small for use as manure—and the process of separation, with the imperfect means that only could have been employed, would have been troublesome, and the result not exact.

We hope that the small proportion of the calcareous part of this marl reported, will not damp the zeal of the discoverer, or others who can use the same means for improvement. The richest parts of the bed perhaps have not yet been exposed to the eye. The sources from which the fluid calcareous matter exudes, and which concretes by age, are probably much richer; and searching for them by boring would probably repay the labor. The hard lumps also may possibly be reduced by time and exposure, (as hard shells are when applied to acid soils,) so as greatly to increase the average richness of the whole quantity of the manure. But at the worst, if the manure should generally contain only ten per cent. of calcareous matter, and can be cheaply applied in large quantities, it may be as valuable as other marl of thrice its strength, but more difficult of access. We regard the discovery of this mineral manure, in this particular region, as holding out a prospect of the most important and beneficial consequences to the agricultural improvement of Virginia.—[*Ed. Farm. Reg.*

GYPSUM FROM SMYTH COUNTY.

A friend who recently travelled through the south-western part of Virginia, has brought to us for examination a specimen of gypsum obtained in Smyth county, where, as he was informed, it is found in great quantity. The lump before us is very pure, and of a texture much more soft and yielding than the gypsum from Nova Scotia, and therefore the more easily prepared for manure. If our friend was correctly informed as to the abundance of this mineral, and if facilities should hereafter be afforded for its transportation, it will not only prove valuable to the farmers of Smyth county, but to many who are hundreds of miles distant from the quarries.

ESSAY ON ROTATION OF CROPS.

BY J. HAMILTON COUPER.

From the Southern Agriculturist.

The difference of effect produced on the fertility of the soil, by the spontaneous growth and by the artificial culture of plants, is so strikingly contrasted, as to present itself very forcibly to all observant minds. Where nature is allowed to sow her own seeds and to reap her own harvests, the earth, instead of being impoverished by her vegetable productions, seems at each new effort but to augment that fertility, which is ever presenting to the eye a varied aspect of beauty and fruitfulness. But very different has been the effect in most countries, where man has controlled the productions of the soil, and limited them to those alone which contribute to the gratification of his wants, conveniences and luxuries. Their exhaustion generally follows production, and utter impoverishment would succeed to teeming fertility, were not resort made to benign nature, or to expensive manures, to restore the lost fertility.

Is this contrast the necessary effect of the peculiar character of the plants which have been selected for cultivation? is it owing solely to cultivation; or has it arisen from a vicious system of agriculture, in relation to both? The continued and increasing fertility of some countries, where these plants are more extensively grown; and where cultivation is carried to the greatest perfection, proves that the impaired productiveness of the soil, is not necessarily the result of the two first causes, whatever may be their tendency; and that it is chiefly attributable to the effect of a vicious system.

The great error of this system has been, that man, instead of following the golden maxim of Lord Bacon, of conquering nature by obeying her laws, has endeavored, in opposition to those laws, to force her into a subservience to his own views. Had he observed the changes of vegetation which were spontaneously occurring around him, he would have perceived, that of the seeds of plants, which are scattered with a lavish hand over the earth, those to which the soil and climate were most congenial, and which found the greatest supply of food fitted to their support, obtained the mastery in the contest for existence; and continued to flourish, until having reduced or exhausted those principles of nourishment peculiar to themselves, they abandoned the soil to others, to which it still afforded the elements of unimpaired luxuriance. These in their turn, having occupied it for a time, gave way to more successful rivals. Thus

the earth, for ever occupied by plants, to the growth of which it is best adapted, presents the greatest mass of vegetation, which, under existing circumstances, it is capable of bearing; and by their decayed remains, and their ceaseless change, the exhaustion of any principle is soon restored, and the fertility of the soil is preserved unimpaired. Here the seeds of plants are abundantly thrown on the lap of the earth, and unerring nature selects those which it is best fitted to bear.

But such has not been the course pursued by man. Of the plants spontaneously produced by nature, he has made a selection; and has wisely aimed at the extension of those best adapted to his use. But his want of skill has marred his own wishes. Ignorant of the principles of vegetation, he has consigned to the earth that which it was not fitted to bear; or if at first fitted, his avarice has induced him to continue the cultivation, until it was no longer so. The soil has been tortured to produce what it refused; and it has been refused that which it could produce. Man labored: the earth was impoverished; and scanty products were the precursors of others still more so.

Happily this gloomy result is not the necessary consequence of the cultivation of those plants, which minister most to the comforts of man. The progress of information, and the important discoveries of the laws of vegetation, which scientific research has made, during the last half century, have gradually led to a correction of vicious practices. And the establishment of sound principles in most of the departments of husbandry, now prove that the cultivator may pursue an uninterrupted succession of useful crops, and at the same time maintain the soil in a state of unimpaired fertility.

This result is mainly attributable to the imitation of the principle of change, which constitutes the great and economical law of vegetable production; an imitation which has led to the most important practice of modern husbandry, the rotation of crops.

I have thought that I could not better fulfil the duty which has devolved upon me by the appointment of this society to prepare an essay upon some subject connected with agriculture, than by attempting a succinct developement of the principles upon which the rotation of crops is founded; to illustrate those principles by the practices of the most celebrated agricultural districts; and to suggest a few hints for a succession of crops for our own country. If in this discussion I am led beyond the legitimate bounds of an essay, I must throw myself on the indulgence of the society, who will, I trust, pardon the trespass on their time, in consideration of the extent and intricacy of the subject, and of its importance in reference to the peculiar deficiencies of our own agriculture.

The problem to be solved by the theory of a rotation of crops is, to ascertain by what combination or succession of crops the soil may be kept in the highest state of improvement, and at the same time be made to yield the greatest net production, for a series of years.

The first object of the rational cultivator, will be to select the most valuable crops, which the peculiar circumstances of his climate, soil and situation admit of. He will further have reference to his own wants, and the demand which arises from markets.

But when he has ascertained the crops which, under these circumstances, are the most valuable, the soil may not be sufficiently enriched to produce them in the greatest abundance, or if sufficiently fertile, the crops may be of a nature so exhausting, as to have a tendency to impair it. He will, therefore, in order to maintain his land in the highest state of improvement, be under the necessity, either of adopting crops less exhausting; of cultivating the exhausting crops less frequently; or of supporting the fertility of his soils by manures.

Where extraneous supplies of manures can be obtained, as from a vicinity to towns, mineral manures, marshes, irrigation, &c. a course of exhausting crops may be followed, without impairing the fertility of the soil; and the judicious cultivator will avail himself of these extraordinary means of enrichment. But as these favorable situations are comparatively few, and as the investigation of the question will be simplified, by omitting any allusion to them it may be assumed as a general principle, that every soil, from its own productions, must be made to maintain its own fertility.

The successful application of this principle depends upon a knowledge of the manner in which vegetables in general tend to exhaust or enrich the soil; and of the nature more or less exhausting of each vegetable.

Plants do not, by the mere effect of their vegetation, impregnate the earth with any fertilizing principles. Their ameliorating influence results entirely from the mechanical action on the soil; the beneficial operation of a peculiar mode of cultivation, during their growth; and the return to the earth of their decayed remains.

As all plants do, to a greater or less degree, subtract alimentary substances from the land in which they grow, were the whole of their vegetation removed from it, all plants would be impoverishing. Their enriching tendency will depend upon the return to the soil, on their decay, of more of the principles of vegetation, than they have subtracted from it, during their growth.

Were all plants alike in their organization and vegetation, their comparative enriching effects would be in the relative proportion of their vegetation removed from the soil on which they grew, to that returned to it,—and to the period of their growth at which it was removed. But this is not the case, for vegetables are found to differ essentially, in their exhausting effects, agreeably to their peculiar character, and to the particular mode of culture which they require.

The food of vegetables is found diffused through the soil; or floating in the atmosphere. And plants derive their nourishment, in part by their roots from the principles contained in the soil on which they are fixed; and in part by their leaves and succulent bark, from the atmosphere which surrounds them.

Vegetables having a system of large, succulent leaves, and much open and tender bark, absorb the greater part of their nourishment from the atmosphere. While those with firm and narrow leaves, and close and hard bark, derive their support chiefly from the soil.

It will be obvious from the enunciation of these principles that, by the cultivation of vegetables with a system of large leaves and tender bark, a greater mass of vegetation can be produced, with a given expenditure of the fertilizing principles of the soil, than by the growth of those with narrow

leaves and compact bark, since a greater portion of the nutriment of the former is derived from the atmosphere.

It is further obvious that, as vegetables with a system of large leaves, draw much more of their food from the atmosphere than from the soil, if they be returned wholly, or in greater part, to the soil, it will receive more of the principles of fertility than it has lost; and that their tendency must be eminently enriching. On the contrary, as plants with a system of narrow leaves receive their nourishment principally from the soil, if the greater part of their product be removed from it, that which is restored to the earth is less than what has been taken from it, and their effect will be exhausting.

The different proportions, in which different vegetables derive their nourishment from the soil and atmosphere, is considerably influenced by the changes which they undergo in their organization during their growth. Before the period of flowering, a greater proportion of their nutriment is derived from the atmosphere. But the reverse takes place during the maturing of the seed. The proportion of food derived from the soil while the seeds are ripening, also depends much upon the peculiar character, and the changes which the other parts of the plant undergo at that time. The more oleaginous and farinaceous the seeds, and the greater their weight in comparison with the other parts of the vegetable, the greater is the proportion of nutritive principles furnished by the soil. This is still more increased when the leaves, bark, and other spongy parts of the plant, become dried up about the period of flowering, and the nourishment requisite to the perfecting of the seeds, is necessarily derived entirely through the roots, from the soil.

From the review of these principles of vegetable physiology, we arrive at the practical inference, that by the cultivation of crops with systems of large leaves, the soil is less exhausted, than if it be made to produce those with narrow leaves, that if the broad-leaved plants are cut before the period of flowering, they are still less exhausting, than if allowed to mature their seeds: and that if the product of their vegetation be returned wholly, or in greater part to the soil, they become eminently fertilizing. Hence they have been called ameliorating crops. On the contrary, as narrow-leaved crops are highly exhausting, the more particularly when they are allowed to mature their seeds; and these seeds and much of their other products are removed from the soil, they have been denominated exhausting crops. With a knowledge of these principles, and of the character of the plants which he cultivates, the agriculturist is enabled to maintain a proper degree of fertility in his soil. If his land be poor, he will cultivate more ameliorating and fewer exhausting crops, until it is sufficiently enriched. If sufficiently enriched, he will maintain it in that state by his ameliorating crops, which are a source of manure to restore to the soil those principles of vegetation which have been subtracted from it by the exhausting crops. This is to be accomplished either immediately, by ploughing in the ameliorating crops; or mediately, by employing them as food for cattle, and applying the products of the farm yard in the form of manure.

This interchange of broad and narrow-leaved crops, constitutes one of the most important principles of a rotation of crops. Its application to practice is, however, to be modified by the circumstances which are about to be mentioned.

We have just seen that vegetables are separated into two classes, in reference to the organs by which they derive their food from the atmosphere. The same utility results from a classification with respect to those by which they take it up from the soil. Hence they have been divided into tap and tuberous, and fibrous rooted plants. The roots of the first class penetrate far into the earth, subtract their nourishment principally at a great depth, and divide the soil by their mechanical action. The latter extend themselves near the surface, draw their food from it, and tend to bind the soil. It results from the different action of these two systems of roots, that their interchange will be mutually advantageous; and that an economy of manure will be obtained by it, for when the surface of the soil becomes exhausted and unable to support the fibrous rooted crop, its substratum may still afford an abundant pasture to plants capable of reaching it, by their tap or tuberous roots.

But independently of the quality in vegetables of withdrawing more or less of their nourishment from the soil, in consequence of the peculiar structure of their leaves and roots, experience has proved that every plant has a habit of vegetation peculiar to itself, which by its action on the soil, after a certain period, renders it unfit to reproduce that particular vegetable, until a restoration has been effected of those peculiar principles of which it has been exhausted. Experience has also proved that, although a soil may be thus exhausted and unfit to produce one vegetable, it may be still in a state highly favorable to the growth of many others. These facts are firmly established by the change of plants which is incessantly renewing and beautifying the vegetable covering of the earth; by the alternation of the trees of our forests, so familiar to us all; by the succession of grasses on meadows; and by the daily observation of all practical agriculturists. But while the fact is confirmed beyond the possibility of doubt, it is to be regretted that this is one of the secrets of vegetation upon which scientific research has shed the least light. In lamenting the want of that clear perception of principles, which is so necessary to the direct and useful application of knowledge, it is, however, satisfactory, that enough has been established to prove that in the interchange of plants of different habits of vegetation, there is a positive economy of the alimentary principles contained in the soil; and consequently that by it a greater product can be drawn from a given amount of manure, than by the continued culture of the same plant.

The effect of plants in exhausting the soil of those principles peculiarly adapted to their support will obviously be greater the longer they have been cultivated. And in whatever way those principles are restored, it is evident that the time taken to accomplish it will bear a ratio to that in which they have been exhausting. It is also evident that, if the recurrence of the same plant, on the same field, proves injurious, the succession of those approaching each other in character will also be so, to an extent, varying with their greater or less affinity.

From these views results one of the leading

principles of a rotation of crops that, the return of the same vegetable, of the same field, or of vegetables approaching each other in character, should be removed as far as possible.

By a judicious succession of broad and narrow-leaved crops; of fibrous and tap-rooted plants; and by an interchange of vegetables of different characters, the cultivator will be able to adapt his crops to the actual state of the fertility of his soil; and at the same time, to maintain it in a progressive state of improvement.

But in obtaining this he has not accomplished all that is required. The order of his crops may be such, as not to admit of stirring the earth, and of drawing it up to the growing plant; operations which are absolutely necessary to the eradication of weeds; which permit the free admission into the soil of dew and heat, and of the gases, and finer particles of nourishment which constitute, or are found suspended in the atmosphere; and which while by a minute division of the soil they make it more absorbent of moisture, at the same time prepare it for the more ready escape of whatever is superfluous: operations, in fine, which contribute eminently to the luxuriance of the growing plant, and to the prosperity of subsequent crops; and which have been found to conduce essentially to the preservation of the fertility of the soil.

An attention to these points leads to a selection of such a rotation as will alternate crops which offer facilities in weeding and stirring the soil with others which do not: and to commence with a cleansing crop whenever the land is foul with weeds, or is likely to be made so, by the application of manures containing their seeds.

As some plants require a greater degree of fertility of soil to effect their full developement than others; and as they require those principles of fertility to be in different states of preparation, and to a certain extent of different kinds, the cultivator will perceive the necessity of applying his manure to the most exhausting crop; and so to arrange the others, as that they may follow in the most favorable succession. Such a succession, as will prevent that useless expenditure of manure, which results from conveying, at one time, to the plant more than it can consume; and which must, therefore, in great part, be dissipated and lost in the atmosphere; or which takes place, when the manure is in such a state, that its fertilizing principles are brought into operation, at a period too early, or too late, to meet the exigencies of the growing plant.

Such are the principles of the convertible husbandry derived from the laws of vegetation. There are others founded on the economy of labor, of time, and of means.

The practical agriculturist will feel the necessity of making such an arrangement, that the labor of preparing the soil, and sowing, cultivating, harvesting, and getting his crops ready for market, may follow in easy, regular, and economical succession. And that it shall be such, as to require the least expenditure of manure and tillage, which may be consistent with a state of the greatest productiveness.

He will also keep in mind that his profits depend upon the economical employment not only of labor, but of time and space. He will, therefore, leave his land unoccupied by a crop as short a time as possible and increase his products by the frequent introduction of double or secondary crops. To this course, he will be the more strongly impelled, when he reflects, that animal and vegetable manures, being volatile, are rapidly evaporated into the atmosphere, whenever the surface of the soil, in which they are contained, is exposed to the action of the sun: that this subtraction of the fertillity of the soil is greatest, when there are no vegetables to be benefited by it; and that it is, therefore, one of pure loss, unattained by any equivalent or peculiar advantage of immediate production, or of remote amelioration. He will not allow his soil to clothe itself with a spontaneous growth: for then that fertility is expended in useless weeds which might be converted into valuable crops, and the selection of the plants, which should be the result of choice, is left to chance, a chance which is likely to intermingle exhausting with ameliorating vegetables, with salutary grasses, baneful weeds, whose ill effects, from the deposit of their seeds, will extend to subsequent crops.

In the preceding observation, an attempt has been made to sketch out, and to elucidate by the sound theories of science, those leading principles of a rotation of crops, which have received the sanction of the ablest practical and scientific agriculturists. Before proceeding to illustrate them by the practices of the best cultivated countries, it may not be useless to present, in a more distinct form, the following recapitulation.

First principle.—In the selection of crops, to consult the climate, soil, situation, the demand resulting from markets, and the other circumstances which constitute the peculiarities of local position.

Second principle.—Plants posessing a system of broad leaves, are to be alternated with those having narrow leaves.

Third principle.— Fibrous rooted are to be alternated with tap and tuberous rooted vegetables.

Fourth principle.—The recurrence of the same plant, on the same field, or of plants of the same character, is to be removed as far as possible. And their return should be so much the longer delayed as they have the longer occupied the soil.

Fifth principle.—Plants which, during their growth, require the operations of stirring the earth and weeding, to be alternated with those which do not.

Sixth principle.—The application of manure to be made to the most valuable and exhausting crops, as far as may be consistent with the preceding principle.

Seventh principle.—The succession of crops should be so arranged, that the work which they require shall follow in easy, regular and economical order.

Eighth principle.—Land should be left bare as short a time as possible, and should be kept covered with plants valuable in themselves, or which contribute to the increased value of those which are to follow.

The first example of a course of crops will be drawn from French Flanders, a part of Europe inferior to no other in the value of its crops, the garden-like culture of its fields, and the skill with which its diversified products are combined, which claims to be the "true cradle of regular and systematic rotations of crops,"* in which they have

* Yvart.

been pursued for a century; and when the fertility and beauty of the country—a happy and comfortable population amounting to nearly an individual to two acres of land, and a disposable surplus of one-third of the products of the soil, attest the perfection of their peculiar system of agriculture, and is the highest eulogium which can be paid to the value of a rotation of crops.

In this district the courses of crops vary with the soil to which they are to be applied, not only in the kind but in the number of the plants of which they are composed; presenting a nice adaptation of the character of the vegetable to the peculiarity of the soil; and fulfilling all, or nearly all of the conditions of an enlightened system of rotations. Amidst the diversity which exists—from this cause, a leading principle is still observable in all of the courses, whether of long or of short duration. The plants which compose them are thrown into three great divisions, comprising different natural families.* These divisions are made to alternate with great regularity, although the plants contained in them are frequently deranged in the order of their succession, to meet the fluctuations of markets, and the vicissitudes of the seasons.

The first division contains *oleaginous* plants, as rape, flax, poppy, cameline and hemp—and plants of the *solaneæ* family, as potatoes and tobacco.

The second embraces *cereal* or grain plants, as wheat, barley, oats and rye.

The third, *leguminous* plants, as beans, peas, vetches, lentils, clover, sainfoin and lucerne.

This mode of succession will be best illustrated by the following example taken from the vicinity of Lille.† It is a rotation on a farm of forty-eight acres.

1st year. Plants of the first division. Rape, with stable and liquid manure, four acres, fallowed as a second crop, by two acres of carrots, beets or turnips.

2d year. Plants of the second division. Four acres of wheat, not manured; second crop, two acres of turnips, carrots, or cabbages, with liquid manure.

3d year. Plants of the third division. Four acres of beans.

4th year. Plants of the first division. Four acres of potatoes, with stable and liquid manure.

5th year. Plants of the second division. Two acres of barley, with clover cut the first year. Two acres of oats, do. do.

6th year. Plants of the third division. Four acres of clover, three cuttings.

7th year. Plants of the first division. Three acres of flax, with liquid manure and oil-cakes. One acre of tobacco, same manure, followed as a second crop, by two acres of turnips, carrots, &c.

8th year. Plants of the second division. Two acres of bearded wheat, two acres of rye, followed by carrots, turnips, &c., as in second crop, with liquid manure.

9th year. Plants of the third division. Two acres of winter barley, cut green, two acres winter forage,‡ followed by two acres of cabbages, beets, or turnips, as a second crop, with liquid manure.

10th year. Plants of the first division. Rape, four acres, for the seed, with stable and liquid manure, followed as a second crop, by two acres of turnips, carrots, &c.

11th year. Plants of the second division. Four acres of wheat, followed by two acres of turnips and carrots, as a second crop.

12th year. Plants of the third division. Three acres of beans, one acre winter barley, cut green, followed by a nursery of rape plants, as a second crop, with liquid manure.

In this course of crops there are four returns of the three great divisions. Each return fulfils most of the important principles. The *first year* the land is well manured, and well stirred and weeded. The application of manure is made to the most exhausting and valuable crop of the series. At the end of this year, the soil is left rich, well stirred and clean, qualities which are required by the grain crops which are to follow. The crops of this year are removed in time to admit of the preparatory operations for those of the next. The *second year* the land is occupied by grain crops, which succeed perfectly well, as it is clean, enriched, and well stirred. No manure is added this year, as its recent application fills the soil with weeds, and from an excess of vegetation, occasions the lodging of the grain. The *third year* it becomes necessary to replace the grain crops,—which have left the soil impoverished, hard, and foul with weeds, by some crop which is ameliorating and cleansing. Hence the cultivation of leguminous crops this year, which by their broad leaves and succulent stems, draw their nourishment from the atmosphere, and by the decay of their leaves, stems and roots, convey it to the soil; which by their system of tap-roots, pulverize the earth,—and by their dense shade and the culture which they require, destroy the weeds produced by the preceding crop.

These effects are reproduced whatever may be the length of the rotation. "It may be seen," says the author from whom this example is taken, "that in this rotation of twelve changes, each variety of oleaginous, cereal and leguminous plants, only returns twice; that the greater part and the most exhausting, as potatoes, flax, are only cultivated once. The great condition, therefore, of an extreme variety of crops is accomplished, and all the others are exactly fulfilled, since ameliorating crops and hoed and manured plants precede and follow the grain crops, which have the double inconvenience of exhausting and infesting the earth with noxious weeds."

The productiveness of this rotation is shown by its yielding four grain, four oleaginous, four leguminous, and four secondary root crops; being sixteen crops in twelve years.

The frequent introduction of double, or secondary crops, forms a striking and valuable feature in this and all the other rotations of Flanders. One not less valuable is, that fallows, whether naked or covered, form no part of them.

It would be interesting to enter into an examination of the course of crops adopted in Dutch Flanders, as they present many useful hints and valuable lessons; but I fear that I have already exhausted the patience of the society—and as I purpose, should leisure permit, to offer at some future time, the result of a personal examination of the agriculture of that country, I pass from it

* *Cordier*. Memoire sur l'Agri. de la Flandre Frangaise. † Idem. p. 291.

‡ A mixed forage crop, principally of legumes.

with the less reluctance to the rotations of England.

These are much less perfect than those of Flanders, as they include, on strong clay lands, a naked fallow, (a practice justly exploded by the best agriculturists,) and from the climate and peculiar circumstances of the country, admit a less variety of plants, and consequently of a less protracted course of crops. These limited rotations are, however, managed with much judgment. I will instance only two.

The first is the celebrated Norfolk rotation,—adapted to a sandy loam. The change which it has produced in the agricultural character of the country, is so notorious as to be familiar to all.—An examination of the high state of culture, and of the beautiful crops produced by it, on soils of the most unpromising appearance, enable me to bear personal testimony of its excellence.

1st year. Turnips, on twenty-seven inch ridges, with from eight to fifteen tons of manure, and one-fourth of a ton of oil-cake to the acre—preceded by four ploughings and harrowings, and cultivated by two or three horse and hand hoeings. The crop eat on the ground by sheep.

2d year. Barley, sown in drills of seven inches, without manure. Ten pounds of white clover and sixteen quarts of rye grass seed sown with it.

3d year. Clover and rye-grass.

4th year. Wheat, in drills nine inches apart.

This course is sometimes prolonged to five years, by continuing the clover and grass a second year.

Its excellencies are, that turnips and clover,—which are ameliorating crops, are alternated with barley and wheat, which are exhausting; plants with different systems of roots succeed each other; the same plants recur only once; the manure is applied to the preparatory and cleansing crop of turnips, which being an ameliorating one, and eat on the ground by sheep, leaves the soil in a high state of neatness and fertility, to receive the exhausting crop of barley, which follows; the interval between the wheat and turnip crop admits of the production of the fine tilth which the latter requires; the clover and grass induce the closeness of staple desirable on a sandy soil for wheat, while the treading of the land by sheep, corrects that openness which is one of the defects of light, gravelly lands. The faults in this course are, that there is a waste of manure in feeding turnips on the ground, and that the shortness of its duration does not admit of the deficiency of manure which results from this cause, and from the number of exhausting crops being supplied from additional ameliorating crops. These defects have led Mr. Coke to combine it with a second rotation, in which a peas crop succeeds a second year of grass, making a six years' course of 1st, turnips, 2d, barley, 3d, cocksfoot and other grasses pastured, 4th, grass pastured, 5th, peas, 6th, wheat. In this rotation the increased number of ameliorating crops, corrects the defect of the preceding.

The next examples which I shall offer to your consideration are taken from Italy, a country which, approaching our own in climate and vegetable productions, becomes the more interesting to us for modified imitation.

On the rich alluvial plains of Po, in the vicinity of Parma, the following course of crops is that generally pursued.*

1st year. Indian corn and hemp, manured.
2d year. Wheat.
3d year. Winter beans.
4th year. Wheat, manured.
5th year. Clover, turned in after the first cutting.
6th year. Wheat.

This is an instance of highly productive and very exhausting rotation; but which is sustained by the great natural fertility of the soil, maintained by the abundance of manure, which is afforded by an irrigated meadow of more than a fourth of the extent of the arable land, cut three times a year, and consumed by large stocks of cattle.

On the rice lands of Lombardy, the rotation adopted is of five years, being three years in rice, and two in natural meadow. For three years the land is planted in rice. "No manure is applied during this time; the continuance of the water would neutralize the effect, and its presence is sufficient for the vegetation. But after these three consecutive crops, the exhausted earth requires sun, air and repose. It is left uncultivated, and the humidity produces a spontaneous growth of plants adapted to the nature of the soil; it is manured—then only on the new sward, and during two years an abundant but coarse crop of hay is gathered from it."†

This rotation is not cited as offering an example for imitation, but merely to show the necessity which, in a country so fertile as Lombardy and where there is a command of water, is deemed to exist of manuring, and of resorting to a dry culture and a change of plants in the cultivation of rice.

In the valley of the Arno, in Tuscany, the following course of four years, is a common one.‡

1st year. Wheat, followed in autumn by haricot beans, intermixed with Indian corn.
2d year. Wheat, followed by lupins.
3d year. Wheat, followed by a forage crop.
4th year. Indian corn, millet or sorglio.

Being seven crops in four years, of which four are exhausting and three ameliorating. We have in this example, an admirable instance of great productiveness, resulting from the introduction of secondary crops, which at the same time happily interrupt the succession of the exhausting plants. It is owing to the latter cause, to great natural fertility, the highest cultivation, and to irrigation—that the soil is not exhausted under this rotation, which has been adopted to meet the exigencies of a very dense population.

I will detain the society, to present to their consideration only one more example of rotation—drawn from the vicinity of Sorento, in the kingdom of Naples, in which our great staple is introduced.

1st year. Indian corn, manured.
2d year. Wheat, followed by beans.
3d year. Cotton.
4th year. Wheat, followed by purple clover.
5th year. Melons, followed by legumes.

Producing eight crops in five years. "It is impossible," says Chateauvieux, "to make a better ar-

* Lettres Ecrites d'Italie à M. Pictet.
† Chateauvieux.
‡ Simonde Tableau de l'Agri. Toscane.

rangement of the various crops. The nature of their vegetation, and the various cultures which they require, alternately rest and prepare the soil, of which the fertility is preserved by this variety, for the production of every thing which the earth can render to human industry."

ON THE USE OF LIME IN AGRICULTURE.

(From Proceedings of the New-York State Agricultural Society.)

West Chester, Pa. Dec. 17, 1832.

DEAR SIR—Your letter, containing a number of *queries* relative to the operation and utility of *lime*, in the process of agriculture, was received in the early part of June last; but as I have been much engaged, during the past summer, with duties which required all my attention,—and, as your letter intimated that answers furnished "any time during the present year" would be in season for your purposes, I have taken the liberty to postpone my reply until now.

I proceed, then, with great pleasure, to furnish you with such facts and remarks as my opportunities for observation have enabled me to offer.—With a view to render the answers more explicit and satisfactory, I will annex them, *seriatim*, to your several inquiries.

Query I. "Upon what lands does lime operate most beneficially?"

1. In regard to geological formation, as primitive, transition, secondary, and alluvial.

2. In reference to the soil, as sand, clay, lime and vegetable matter.

3. As indicated by natural growth of timber and plants.

Answer. My residence has always been in a *primitive* region, and my observations very much limited to agricultural processes in soils upon that formation. The prevailing rock here is gneiss,—with occasional beds, or veins, of hornblende,—greenstone and sienite. About five miles to the north of us, is the great valley of transition limestone stretching from the north-east to south-west, and immediately on the southern side of this valley, running parallel with it, is a broken ridge of hills, formed of mica slate, with beds of serpentine rock and hornblende, on the side next to the gneiss rock, on the south-east. Over the gneiss rock, and among the hornblende, the soil is generally a stiff loam; and there, I think, the best effects are perceptible from a given quantity of lime. On the soil overlaying the shistose rocks, the good effects of lime are sufficiently obvious, under the management of skilful farmers; but the benefits seem to be less permanent. On the serpentine rock the soil is extremely sterile, and neither lime nor barnyard manure can be used with much advantage. In the limestone soil of the great valley, where one would suppose it was already redundant, lime is used with advantage, and much heavier dressings are put on, than in the adjacent districts. I cannot furnish the ***rationale*** of this practice, but I believe the fact is established, that more lime is required to produce the same beneficial effect upon soils resting on limestone rock, than upon those overlaying gneiss, and perhaps some other primitive rocks.

I have had no opportunity to witness the effect of lime upon *secondary*, and strictly *alluvial* formations; but the above circumstance has led me to suspect that the *same quantity* of lime would not be so signally beneficial in secondary, as it is in certain primitive formations.

Lime, undoubtedly, has a good effect in soils which are *sandy*,—even where sand predominates; but I believe its meliorating properties are most conspicuous in a *clay* soil, or rather in a *stiff loam*. A good proportion of decomposed vegetable matter adds greatly to the beneficial effects of lime; and hence our farmers are desirous to mingle as much barnyard manure as possible with their lime dressings, and to get their fields into what is called a good sod, or turf, full of grass roots. *Then* a dressing of lime has an admirable effect.* The soils indicated by a natural growth of black oak,—(*quercus tinctoria*) walnut, (*juglans nigra*) and poplar, (*liriodendron*) and those in which such grasses as the *poas* and *festucas* best flourish, are generally most signally benefited by the use of lime. In short, I may observe, that lime has been found more or less beneficial in every description of soil, in this district. It is most so, on hilly, or rolling lands, where clay predominates; less permanently so, among the mica slate; and least of all, on the magnesian rocks. The soil on these last is rarely worth cultivating.

Query II. "What quantity of lime is applied to the acre, upon different soils, at a single dressing, and during a period of years?"

Answer. The quantity of lime, per acre, which can be used advantageously, varies with the condition and original character of the soil. Highly improved land will bear a heavier dressing than poor land. On a soil of medium condition, the usual dressing is forty to fifty bushels per acre. A deep, rich soil, or limestone land in the great valley, will receive seventy to eighty, (and I am told even one hundred) bushels to the acre, with advantage. On very poor land, twenty to thirty bushels per acre, is deemed most advantageous to commence with. It is usually *repeated* every five or six years—i. e. every time the field comes in turn to be broken up with the plough; and as the land improves, the quantity of lime is increased. The prevailing practice here is, to plough down the sod, or *lay*, in the fall or early in the spring,—harrow it once, and then spread the lime (previously slaked to a powder) preparatory to planting the field with Indian corn. Every field, in rotation, receives this kind of dressing; and as our farms are mostly divided into about half a dozen fields, the dressing, of course, comes once in six years, more or less, according to the number of the fields. Some enterprising farmers, however, give their fields an *intermediate* dressing, *on the sod*, after they come into grass, which I consider an excellent practice, tending rapidly to improve the condition of the land.

Query III. "Is it applied in a caustic or an effete state?"

Answer. It is usually obtained in a caustic state from the kiln, deposited in heaps in the fields where it is to be spread, and water sufficient to

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* The yard manure is not usually mingled with the lime, when the latter is first applied. The practice is, to lime the *Indian corn* ground, prior to planting that grain on the inverted sod,—and, the ensuing spring, to manure the same field for a *barley* crop;—or, to reserve the manure until the succeeding autumn, and apply it to the *wheat* crop. It is not well settled which of these is the better practice. Each has its advocates, but it is most usual to reserve the manure for the wheat.

slake it to a powder, is then thrown upon it. As soon as slaked, it is loaded into carts, and men with shovels distribute it as equally as possible over the ground. It is generally considered best to put it on the ground whilst it is fresh, or *warm*, as the phrase is; and it is certainly easier to spread it equally, while in a light pulverised state, than after it gets much wet with rains. I am inclined to think, too, it is better for the land, when applied fresh from the kiln.

Query IV. "To what crops is it most advantageously applied, and at what seasons?"

Answer. It is usually applied, as already intimated, to the crop of *Indian corn*, in the spring of the year—say the month of April. Occasionally it is applied, preparatory to sowing wheat, in autumn. When used as a *top dressing*, on the sod, it is generally applied in the fall—say November. The prevailing impression is, that it is most advantageously applied to the Indian corn crop; and hence the general practice. But the truth is, it is highly advantageous at any, and at all seasons;—and our shrewd old farmers have a saying,—"*Get your lime on for your corn, if you can,—but be sure you get it on the land some time in the year.*"

Query V. "How is it incorporated with the soil—by the plough or the harrow? and is it applied in any case as a top dressing to grass and to grains, and with what effect?"

Answer. As already stated, after the sod is ploughed down for Indian corn, it is usually harrowed once, to render the surface more uniform. The lime is spread as equally as possible over the field, and then the ground is well harrowed in different directions, in order to incorporate the lime with the soil. Soon afterwards the field is marked out, and planted with corn. The plough is rarely, if ever, used, for the purpose alluded to. I have mentioned above, that lime is occasionally used as a top dressing, for grass. It appears to be particularly beneficial to that crop, and answers extremely well, when applied in that manner. The practice of applying it to Indian corn, as above related, is, however, chiefly followed; and the application of a dressing to each field, in rotation, causes as much labor and expense every year, as our farmers generally are willing to incur. Lime has rarely been used as a top dressing to *grain* crops, within my knowledge.

Query VI. "What is the ordinary cost, per acre, of liming, and the relative profits, in increased products, of a period of years?"

Answer. Quick lime, at the kilns, usually costs twelve and a half cents per bushel. The farmers generally haul it with their own teams, and the additional expense depends, of course, materially upon the distance. It is frequently hauled by them a distance of eight, ten, and even twelve miles.—The average, perhaps, is about five or six miles. It is delivered to me by the lime burners, (a distance of near six miles,) at eighteen cents per bushel. At the rate of forty bushels to the acre, the cost, at eighteen cents, would be $7 20 cents per acre. It is difficult to estimate, with precision, the relative profits, in increased products.—But I can safely say, from my own experience, on a small farm of middling quality, that two dressings of lime at the above rate, in the course of eight or nine years have more than trebled the products of the land to which it was applied, both in grain and grass. It is to be understood, however, that the system of *ploughing only so much ground as could be well manured*, was adopted at the same time. I may also observe, generally, that the farmers of this district, (who are shrewd economists) are so well convinced of the beneficial effects of liming, that, costly as its application seems to be, they are unanimous in sparing no effort to procure it. Lime has been found to be peculiarly favorable to the growth of pasture, when the farm is otherwise well managed: and, as our farmers are mostly in the practice of feeding cattle, they resort to liming as an indispensable auxiliary to successful grazing.

Query VII. "Is lime applied with yard manures, or earthy composts, and with what results?"

Answer. I have already intimated that vegetable matters, and especially yard manures, are highly important in conjunction with lime. Both are valuable, even when used separately;—but when combined, the effect is most complete. If to this be added the great secret of good farming, viz. to plough only so much ground as can be well manured, the state of agriculture may be considered nearly perfect.

Lime is, in some instances, added to earthy composts, preparatory to distribution on the field. But it is doubtful whether the extra labor of this method is compensated by any peculiar advantages. It is not generally practised.

Query VIII. "Is powdered limestone (carbonate of lime) applied to soils—and if so, does it induce fertility otherwise than by mechanically ameliorating their texture?"

Answer. No instance of powdered limestoue being applied to soils has come under my notice. I can therefore form but a very imperfect opinion of its utility. If it were even as beneficial as quick lime, (which I doubt) I apprehend it could not be procured and applied with less cost and labor.

Query IX. "On what soils, if any, in your neighborhood, is lime found to be inoperative, as a fertilizing application, and the cause of its failure?"

Answer. There is no soil in this district, deemed worthy of cultivation, on which lime is *wholly* inoperative as a fertilizer. On some sterile, slaty ridges, and on magnesian rocks, it has indeed but a slight effect; and even the benefits of barnyard manure are very transient. In low, swampy grounds, also, unless they are previously well drained, the labor of applying lime is pretty much thrown away. There seems to be something in the constitution of magnesian rocks peculiarly unfriendly to the growth of the more valuable plants. Indeed there are patches of the soil perfectly destitute of all vegetation. Repeated attempts have been made to cultivate the bases of our serpentine banks, but neither lime nor manure will enable the farmer to obtain more than a light crop of small grain. Neither clover, nor the valuable grasses can be induced to take root and flourish in the ungenial soil. It is, therefore, almost universally neglected.

I have thus endeavored (in rather a desultory manner, I confess,) to answer your queries according to my best judgment. If what I have furnished shall in any degree tend to make the subject better understood, I shall be amply gratified. With great respect, I have the honor to be, your obedient servant, WM. DARLINGTON.

Jesse Buel, Esq. Cor. Sec. &c.

For the Farmers' Register.

MEMORANDA OF THE GENERAL SYSTEM OF CULTIVATION AND IMPROVEMENT PRACTISED BY FIELDING LEWIS, ESQ. OF WYANOKE.

Reports of the practices and opinions of experienced and successful farmers, however incomplete, or limited in their plan, are generally interesting and instructive to those who have still to contend with similar difficulties, and are able to make use of similar means for the improvement of their lands. Independent of these general considerations, there are other circumstances peculiar to the farm of Mr. Lewis, which may cause a report of its management to be more satisfactory than might be presented elsewhere, even though equal intelligence and industry had been exercised, and equal or greater improvements made. Under these impressions, I offer the following memoranda of a visit recently made to Wyanoke, (April the 19th, 1833,) the time of which was diligently employed in viewing the farm, and making inquiries, the answers to which will be here presented. The general appearance of the land will be described as it struck upon the first view of a stranger: but the details of practice, or opinions, will be given as furnished by Mr. L. aided (when he found it necessary) by reference to the diary of his operations.

The lower part of Wyanoke, belonging to Mr. Lewis, is situated on the north side of James River, in Charles City County. The whole farm (exclusive of 150 acres of land outside of the enclosure, principally low marsh,) consists of 600 acres of land, almost entirely arable. It is a low peninsula, surrounded by the river and a small creek, except on one side, where a straight land line forms a boundary. The whole peninsula, though nearly level throughout, is no where entirely so: but has a gently undulating surface, which serves to keep the soil abundantly dry, without there being any were enough declivity to be objectionable. The whole of the arable land was cleared long ago; and as its natural boundaries forbid an alteration of the extent of the farm, the quantity of land subjected to tillage has not varied in half a century. For this reason, the rate of improvement may be here estimated with a degree of precision that is rarely attainable on other farms, where new clearings or other circumstances have frequently served to alter the extent of land cultivated. Wyanoke is altogether of that class of low lands which are found at intervals along the tide water of James river—which seem to have been formed by the alluvion of the river, but which formation could not have taken place, unless the water had then both a volume and rapidity very far exceeding what now exist, and a long continued elevation withal, 20 feet higher than has ever been known. Such an origin, apparently, had the fine lands of Curle's Neck, Shirley, Berkley, Westover, Flower de Hundred, Brandon and Sandy Point, and various other tracts, which, notwithstanding all the existing diversities of soil, and of elevation, maintain a general resemblance. Wyanoke stretches out so as to form an angle in the course of the river; and the many depressions in the land extend through from west to east, and nearly parallel to each other, seemingly as if the river had passed over in its direct course, forming the land by its sediment, and leaving in these depressions the channels or traces of the strongest currents. The upper or western side of the land is the highest, and the elevation gradually increases through the adjoining land, (Dr. Minge's,) which is of the same apparent formation and general character. But contrary to what might be expected from such natural causes, the upper and most elevated lands are the most argillaceous, and the eastern and lowest extremity of the peninsula, is a silicious sand, of which the particles of course are much heavier. This lower extremity has but a few feet of elevation above the highest tides; and the depressions are there low enough to be often covered by the tides, unless where protected by short dikes. The few and narrow strips thus injured or lost form the only unproductive or waste land within the mass of arable. The western end, which is generally the highest, may be called a good loam of medium texture, equally removed from adhesiveness and looseness. The lowest and some other parts are very sandy and loose in texture, and the great body of land is of different grades between these two extremes. In its impoverished state, and when under tillage, a great part of the farm in dry weather might suffer injury from the force of high winds.

The general fertility and peculiar value of the low lands referred to above, are well known. Lower Wyanoke seems to differ from all in being more sandy, and until improved, was also much poorer, than the greater part of those lands. Enough still remains unimproved to indicate the general quality of nearly all the farm in 1794, when Mr. Lewis became its owner, and perhaps long after. A considerable space, which has never yet been limed, now appears even more unproductive than Mr. L. estimates its probable yield; viz: 15 bushels of corn, or 8 of rye. Such poor land he finds more profitable in rye or oats, and therefore does not sow in wheat; but supposes it might bring 5 or 6 bushels to the acre. The natural growth now on it is very meager, and throughout is in part formed of sheep sorrel and *hen's nest* grass. This piece is very level, and has well improved ground lying along side. It is rather more sandy than the average of the farm. Except for the reddish brown colour of this and the other unimproved land, there is no perceptible indication of its having been rich in a state of nature, which Mr. L. supposes was the case with the whole of Wyanoke, though all was impoverished before he first knew the farm. All the spots that have not been limed (and they are in various places) show a considerable growth of sorrel—and it appears in smaller quantity even in many places that have been limed, thus proving sufficiently the original suitableness of the soil to that weed. The reddish brown color belongs to all the land, being the darker where most improved. The subsoil is not very different from the soil, but is more sandy. No clay any where.*

It is a very general opinion in Virginia that

* Two samples of soil were selected to ascertain by subsequent examination the actual proportions of silicious sand contained. The land from which one sample was taken was considered by Mr. L. to be of medium texture, compared with the whole farm—had been limed at his usual rate some years before, as well as manured, and now supposed to be capable of yielding 32 or 33 bushels of corn, and afterwards, 14 or 15 bush-

sandy soils are greatly inferior to clay soils, in their capacity for receiving durable improvement, and yielding the most valuable products and profits to the cultivator. This opinion has probably grown out of the facts, that nearly all of our most valuable lands are loams of different degrees of adhesiveness, and that our sandy soils are almost always poor, and of little profit to their owners. Another opinion, still more extended, and indeed almost universal is, that though rich sands may be even the best of corn lands, they must be comparatively worthless for the production of wheat. The belief long entertained that both these opinions are quite erroneous, formed another inducement to present a report of the farm, which furnishes abundant proof that the mere deficiency of clay does not prevent a soil reaching the highest value. Wheat requires a stiff soil to yield the greatest possible product—but such lands require so much labor, and their management depends so much on the season and weather, that their crops of wheat are often less heavy, and still oftener less profitable, than on good sandy soils, where the friability of texture causes tillage to be far cheaper, and the alternations of wet and dry seasons have comparatively but little effect in injuring the crop, or obstructing tillage. The crops of a sandy soil, of which the maximum product is 25 bushels of wheat, would generally be heavier, and certainly would give more average clear profit, than those of clay soils that might bring 40 bushels, under the most favorable circumstances. But it is time to bring forward in support of this position, opinions and practice that will be justly deemed of much higher authority, than any deductions or reasoning of mine.

Rotation of crops, and general plan of cultivation. The farm was formerly kept by Mr. L. under the three field rotation, 1. corn—2. wheat—3. at rest under the spontaneous growth of grass and weeds, and more or less grazed. At that time, and long afterwards, this rotation was the mildest in use in lower Virginia. Since 1816, his rotation has been 1. corn—2. wheat on all good land, and oats or rye on the unimproved and poorest—3. clover, mowed—4. clover, grazed. Clover however has occupied no more land than had been previously limed. Field peas, which always follow the new application of lime, take a part of the field of the 4th year: and another smaller part is under turnips. Formerly, 190 acres, or one third of the farm, was every year under wheat, except such parts as were quite too poor—and the average crop was less than 1000 bushels. Now 140 acres make a field, and the unimproved or poorest parts (usually about 40 acres) being in rye or oats, only about 100 acres are put under wheat, and the annual average crop is now more than doubled. Last year, 1832, when only 98 acres were in wheat, the crop was over 2000 bushels. The present average product of all the land usually put in wheat, is supposed to be twenty bushels—and the corn from the same land the previous year is 35 bushels or more.

Though Mr. L. has been, since 1794, attempting to improve his land by using putrescent manures in unusually great quantities, and by his well known careful and judicious general management, still the great improvements made have commenced within the last twelve years, during which time he has been regularly applying lime, and has now given that manure to about three-fourths of the land. He had made small experiments with lime as long as six years before, when its use was unknown in this part of the country, except in small experiments. But for the last twelve years, like some other neighboring farmers, he has gone as fully into the practice as the supply of shells and the disposable labor of the farm would permit. Lime first enabled him to make clover a field crop. Before, it could not be produced with any certainty or profit, except on the richest lots around the houses, which had the best preparation and every care bestowed. It is now an abundant crop wherever his lime and the subsequent covering of putrescent manure extend.

The quantity of stable and farm pen manure prepared and applied are unusually great, even considering the abundant supply of materials, compared to the general usage. But no other means for furnishing vegetable substances to the soil are used, no green crops ploughed in, nor the entire growth of grass left any where to rot upon the land. It is preferred to pass every putrescent material through the stables and cattle yards. In this respect the practice of Mr. L. differs essentially from other successful improvers of the soil. His green or meliorating crops of clover, peas, &c. are partly secured for dry food, and the balance consumed by live stock in the field. He has tried marsh mud, (to which his access is very easy,) but found it not worth the labor. It was of a kind composed principally of decayed vegetable substances. Naked fallows for wheat are rejected; and even wheat on clover lay, as being on the whole less profitable on such land than wheat after corn. This decision is not influenced by a belief that the former practices would be injurious to the soil. He is not satisfied of the correctness of the common opinion, that the soil is impoverished by exposure to the sun.

Burning and applying oyster shell lime. Close kilns with walls of brick or stone, have not yet been used to burn oyster shells for manure; and until fuel becomes more costly than the additional transportation of the lime, it will be cheaper to use wooden kilns. What are commonly called lime kilns are merely heaps of wood and shells, built up in a somewhat cubical form, by which the burning is imperfectly performed at great expense of fuel though without much trouble. Mr.

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els of wheat to the acre. The other sample was chosen to show the texture of the lightest soil forming any considerable part of the whole extent of the farm. The results obtained were as follows:

1000 grains of the medium soil, yielded

825	—	sand, mostly coarse, and almost none very fine.
164	—	fine clay, &c.
11	—	lost in the process of separation.

1000 grains of the lighter soil, yielded

873	—	sand, still coarser than the other.
122	—	fine clay, &c.
5	—	lost.

Much of the sand of both samples was tinged with the color of rust of iron. The clay was brown, slightly inclining to red. No carbonic acid gas could be expelled from either sample, and therefore no *carbonate* of lime was present.

L. burns his shells in the following manner. A pen of sixteen or seventeen feet square, is built of round green pine logs, (notched where they lock, so as to come as close together as their form will allow,) and with a floor of similar logs, chinked with smaller pieces, so as to prevent the shells dropping through. The bottom logs of the kiln are laid on four corner blocks, of twelve inches, so as to leave a vacancy of twelve or fifteen inches between the earth and the bottom of the floor, which is to be packed closely with dry wood. The walls of the pen are raised about nine feet; and about one hundred logs of six to eight inches through (which these now put up seemed to be,) usually serve for the floor and side walls. The shells are thrown in, and in layers of different degrees of thickness, according to their order, and separated by thin layers of pine wood, cut eight feet long, and split to the usual size for fuel. The size of the last kiln burnt by Mr. L., according to his memorandum book, was as follows:

Kiln 17 feet square and 9 feet high, inside measure.

The lowest bed of shells 8 inches, (he thinks it might as well have been 12 inches.)

The second bed of shells 12 inches.

— third	—	— 16	—
— fourth	—	— 20	—
— fifth	—	— 15	—
— sixth	—	— 6	—

The layers of wood between were equal, and about six inches. This kiln took one hundred hogsheads of shells, and consumed ten cords of wood in the layers, and three more of foundation or kindling wood. The kiln should be fired in calm weather; and if the wind afterwards rises, it should be kept off as much as possible by a screen of brush, or whatever may be most convenient.

The burning (in preference) is done in March, or as soon after as may be. The newly burnt shells are carted to the field as soon as they are cold enough, and deposited in small parcels of a measured heaped half bushel each, at distances of six yards. The field is previously ploughed, and marked off carefully in checks of six yards square. These small heaps of shells are immediately covered completely, but not heavily, by the surrounding earth being drawn over them with broad hoes. If a heavy rain was to catch the lime before this covering, much of it would become a wet sticky mortar, difficult to manage, and impossible to distribute equally. When secured in the heaps, the moisture absorbed from the earth will usually slake the lime in forty-eight hours. The heaps are then cut down and mixed with hoes, and carefully spread so as to cover the field very equally. The land is then well harrowed, more effectually to distribute and mix the lime with the soil. The quantity applied to the acre is about seventy bushels of the burnt and unslaked shells, which quantity is produced by burning 6 hogsheads (108 bushels) of shells; and the same, if well burnt, will swell in slaking to 125 or 130 bushels. The lime is always put on a part of the field of the fourth year, and is put under field peas the same year. The red, or cow pea, is preferred, being considered most profitable for live stock; and as that is a late kind, it should be planted as soon as possible after the 20th of April, that the crop may mature. Two after ploughings and one slight hand weeding serve to cultivate the crop; and its product, Mr. L. thinks, though without having made any experiment or careful estimate, usually pays the whole expense of the liming. He has the bulk of the peas gathered by hand, but not closely; and the remaining pods and vines are eaten on the ground by cattle. The peas are partly ground into meal and mixed with other food for mules, for which use they are much valued. Mr. L. has never compared the products of peas with corn on equal land, but supposes that more bushels per acre would be obtained from corn.

Mr. L. does not think that a heavier cover of lime would be much more effective. He showed the ground where an experiment had been carefully made to test this question, and which is still on trial. Three years ago a certain space marked out through equal land, was limed with a second cover equal to the first and usual quantity, which had been applied to the field four years earlier, and was followed by manure from the stable and farm yard, the year after the first liming. The field is now in wheat, and the growth excellent throughout, but unequal, and the part doubly limed is not perceptibly superior to that on either side. Still he expects a different result on a soil less light, and applied his last lime as a second and lighter dressing to the stiffest loam, in preference to the lightest land that had yet received none. He has found that the lightest soils here, and the stiffest among the clay soils of his farms in Gloucester, are neither so much improved by liming as are soils of medium texture.

The whole expense of liming has not been estimated by Mr. L. nor has the benefit from lime alone been ascertained. He always covers with putrescent manure the whole of the previous year's limed land, and sows all in clover. The durable benefit obtained from the manure in part, and the whole value derived from the clover, are indirectly the effects of the lime. The expense bears a very small proportion to the profit. The only difficulty in liming, arises from the scantiness of the supply of shells, and the fear that they will be still more scarce, as their use extends. Small vessels now bring cargoes of oyster shells and sell them (on board) at 62½ cents the hogshead. The labor of landing them is an additional expense to the farmer.

Gypsum had been frequently tried on clover as well as other crops before liming, and with little or no benefit. It has not been tried since liming, but he is now about to make the experiment again.

No value is attached to the caustic quality of the lime, and indeed it is supposed to have lost that quality by exposure under the usual treatment, before the succeeding crop of peas begins to grow. Ten or twelve days are generally allowed to intervene for this purpose, between the spreading and harrowing in of the lime, and the planting of the peas. When peas were planted immediately after the spreading, their growth was thought to show some injury from the remaining causticity of the lime. Still Mr. L. is not satisfied, that an equal quantity of mild calcareous earth in any other form, would serve as well as lime prepared by burning. Without denying the correctness of that deduction from his opinions and practice, he prefers adhering to the practice which experience has proved to be highly beneficial and sufficiently cheap. No banks of fossil shells are on his land,

nor nearer than eight or ten miles distance by water carriage.

As one fourth of the farm has not yet been limed, the general improvement by that means is still in progress, and the increase of crops may be fairly supposed to be yet much below what a few more years of the same practice will exhibit.—Whatever increase of product has been obtained is almost entirely owing to the lime, considering its indirect as well as its direct benefits. Without lime, there was (and could be) no improvement from clover: and all the putrescent manure used before liming, seemed merely to keep the products of the farm from decreasing. This opinion requires no stronger proof than the following table of all the crops of corn and wheat made for 21 successive years before liming was begun, and when the farm was under the regular three shift rotation. The fulness and accuracy of Mr. Lewis's diary, has enabled him to furnish me with this statement.

YEAR.	WHEAT. Bushels.	CORN. Barrels.	Price of corn sold.
1796	1162	516	$3 75
		842	3 00
1797	896	650	3 00
1798	975		
1799	1280	661	2 50
		620	4 41
1800	790	750	3 33
1801	1400		
1802	1453	811	2 46
		626	4 00
1803	940	573	5 00
1804	1150		
1805	866	650	2 33
		524	5 00
1806	1160	680	2 00
1807	980		
1808	1060	646	2 33
		700	3 50
1809	987	750	3 75
1810	1060		
1811	1255	548	4 00
		652	3 00
1812	905	667	3 33
1813	820		
1814	790	494	3 82
		448	4 00
1815	1220	425	7 00
1816	942		
	Average 1052	Average 630	

Though this table shows much difference of product from good and bad seasons, there is no apparent average increase in the product of any one field. The crop of wheat, which stands first in each division of three years, was in every case on the field which was in corn the previous year; and in like manner for the second and third crops.—Thus each division of the corn crops shows the whole product of the whole farm in corn—and the same as to the wheat, for as much of each field as was worth putting under that crop. The fields were about 190 acres each. When divided into four fields, after 1816, the crops of the first years were diminished, by each of the fields losing about fifty acres in extent, notwithstanding the counteracting benefits then beginning from lime. The last crop of wheat (1832) was 2199 bushels, from 98 acres, and 88 bushels of seed. The season was good for wheat—the field is rather more productive than the general average of the four, but is not the best of them.

The crops of corn have not been so much increased as those of wheat for several reasons. The unimproved part of each field is now, as formerly, always under corn in its turn, and it may be well supposed that no increase of product is shown there; and the former impoverishment of the other land did not lessen the yield of corn so much as wheat, from the peculiar fitness of this sandy soil for the growth of corn.

Since the putrescent manures have succeeded lime, it is not supposed that their beneficial effects have been lost by time and after cultivation. It needs no other evidence than the foregoing table of crops to prove that the effect of the manure formerly applied must have lasted but a very short time.

Putrescent manures. About 50 head of cattle are kept, (not counting the calves under a year old) 60 sheep, 10 or 11 work horses or mules, 4 saddle and carriage horses, and as many hogs as will furnish about 50 annually to be slaughtered for bacon. From 2600 or 2700 good horse cart loads of manure from the stables and littered pens, (with some other putrescent matters) are usually made, besides the land manured by naked cow-pens in summer. The whole space manured already for the present corn crop, amounts to 54 acres. The vegetable materials used as food and litter to make this manure, are the straw of the wheat crop, the stalks and the better forage of the corn, the clover from as much as can be mowed of the limed land of one field, and the coarse hay of 18 acres of wet marshy meadow. Leaves raked in the woods, are enough valued to be carted (when leisure permits) two and a half miles, which is the distance from the woodland belonging to the farm. Five or six acres of turnips are also made, which add greatly to the value of the manure, as well as to the food of the milch cows, oxen, &c. The winter pens for cattle are made in the field to be manured, which is always the land intended for corn. Plenty of litter is furnished, and early in January the ricking is commenced, and continued from time to time as the state of the weather and the manure may require. The stable yard has a long pit 18 inches deep, into which the fresh manure is thrown, with the litter cleared out of the stables. This general clearing out is not done except on rainy days, or other leisure times. When quite wet, this manure is carted from the pit, to aid in forming a rick made just without the cow-pen. For this purpose the parcels of litter from the cattle and from the horses, are laid in alternate beds on each other, two feet of the former to one foot of the latter. The ricks are built 16½ feet wide, (being the width of three corn beds,) 5 feet high, (which lessens to 3, by settling and fermentation) and of any length that is convenient. The materials are thrown on very lightly, and the building proceeds from one end of the rick, so that each part is soon finished, after its foundation is laid. This ricking is done whenever the manure is wet enough, without much regard to the time the materials have been exposed to trampling. The ricks usually begin to ferment in forty-eight hours, and in fifteen or twenty days may be carted to the field. Its texture will be then considerably softened, though the manure, when used, cannot in

general be said to be as much as half rotted. Poles are placed in different parts of the ricks when they are made, and by pulling them out and feeling them, the heat of the whole mass is known. By this mode of fermenting, *fire fanging*, (the white mouldy appearance so common on manure,) is avoided, and the whole rick makes good manure. The cow pen litter when used alone for manure, was always found very weak. Mr. L. thinks it proper to heap and ferment the manure, so as to break down the texture of the coarse litter, but does not approve of thorough fermentation, any more than the total want of it.*

The times of carting out the manure from the ricks, do not depend so much on their age, (after having been heaped fifteen or twenty days,) as upon the state of the land. When carried out, the heaps are dropped at 24 by 27½ feet, spread and ploughed under very carefully, and as soon as possible to avoid waste from exposure to the air. The whole job had been completed but a few days before the day of my visit (April 19th.) The manure now making in the stables and littered pens, will be used for turnips, after being ricked. Of course the season, and the length of time will cause the fermentation to be more complete. Mr. L. does not approve of top dressing, though no actual experiment had proved the loss incurred by that practice; but supposes it may be advisable when the manure is perfectly rotted. The cattle will now soon leave their last littered pens for movable pens on the naked land, as is the usual practice. During the summer, about five acres are dunged in this manner. The land intended to be manured by the summer pens, is ploughed first and as much as is manured in good time, is prepared for turnips.

The raked leaves are used only for the hog pens, in which they are put so thick as to prevent the hogs from rooting to the earth below. Enough of this litter is used to make about 300 loads of manure, the quality of which is very good. The pine leaves are considered the most valuable. All the hogs are confined in pens through the winter and spring, until the clover is enough advanced for their grazing, when they are turned upon the field of the fourth year. They are now confined, and on corn feeding. Forty hogs nearly grown, in one pen at this time, are kept in thriving condition on two bushels of corn a day. Simblins are raised for hog food, and considered very valuable for that purpose. It is not from choice that the hogs are thus kept in pens, but because if turned outside of the enclosure they are often lost or stolen. The cattle and sheep have some advantage from 150 acres of land outside of the enclosure, of which much the greater part, however, is low tide marsh, from which the cows can get very little food, and the sheep none.

Throughout the winter the cattle are confined to their pens, except during the short time required to drive them to water twice a day. The fallacy of the general opinion that close confinement of cattle in littered pens is injurious, by making them both lousy and diseased, is sufficiently exposed by the good condition of the stock of Mr. L. under this treatment. The injury imputed to this cause is in fact, produced by a want of enough litter to keep the cattle dry and comfortable.

With sheep, the case is different. Though the want of suitable pasture ground for them compels Mr. L. to pen his small flock during winter, they suffer from the confinement greatly; and many would die, but for the succulent food furnished them in turnips. Peas are given to them also, in considerable quantities. The management of sheep which Mr. L. adopts, is not such as he deems profitable, or would recommend to others. He considers their grazing so destructive to grass, and consequently so injurious to the soil, that it causes him to keep no more than will serve for the supply of mutton and lamb for the family.

It being my object only to report the general system of cultivation and improvement, I do not enter upon the feeding of live-stock, except as connected with the making of manure. Yet there is no part of the economy of Mr. Lewis's farm more admirable (as is generally supposed) than his manner of feeding, particularly as it regards horses and mules.

Preparation for Corn.—Low as is the Wyanoke land, and with a surface seemingly shaped so as not to permit much surface water to run off, very little draining is any where requisite, and cultivation with a level surface is admissible, except on some of the land so low as to be affected by the highest tides. Generally, the open texture of the soil and subsoil is sufficient to pass off all superfluous water from the surface.

Not a spring bursts out any where on the farm, and there is no need for any side ditch to cut off such oozing waters as form the greatest objection to our hilly lands. This absence of springs is one of the great advantages possessed by the cultivators of soils formed like Wyanoke. But though ridges and water furrows are not wanting to keep the surface dry, the corn land intended to receive the manure is always ploughed and tilled in 5½ feet beds, under the belief that the manure can in that manner be best secured in the soil, and less disturbed and exposed by the after tillage. Still, the manure is not accumulated in the former water furrow, when the beds are reversed; for care is taken so to spread it, that it may be dispersed as equally as possible through the whole width of the bed. The land not recently manured is ploughed

*It is surprising what different opinions are held with regard to the most advantageous preparation and economical application of farm yard manure. Even within the small county of Charles City, practices the most opposed, are found on the farms of several intelligent gentlemen, all of whom are good farmers, and successful improvers. The practice of Mr. Lewis is described above. Mr. William Minge, of Sturgeon Point, leaves all his manure undisturbed on the farm yard until after harvest, when it is moved, put into large heaps, and covered with earth, to remain until used the succeeding spring on corn. Mr. John Selden, of Westover, uses the whole of his farm yard manure the spring it is made for corn, without heaping to ferment, Mr. Hill Carter, of Shirley, leaves his manure in the yard, thickly covered with straw, until August and September, when it is carried out and ploughed in on his fallow for wheat. Mr. Collier Minge, of Walnut Grove, approves of and practices top dressing on wheat. Some other differences, though less striking than these, may be found in almost every farmer's practice; yet each one thinks his own course the best to avoid (what all alike fear) the great waste of the enriching principles of the manure. Such opposite opinions and practices, show how much is lost for want of free communication and discussion, and that by an interchange of opinions, each individual perhaps might both receive and dispense instruction.

flat early in the winter, the rows laid off in checks, and tilled by double shovel ploughs, and other implements suitable to the friable and yielding nature of the soil. The labor of tillage is very light, considering the richness of the land, except where wire grass grows: and even those spots are made nearly as easy to cultivate as the balance, by removing that abominable weed at an enormous cost of labor, before planting the crop. The growth of wire-grass seemed the only considerable evil attendant on the numerous advantages of this farm. The sandy and rich soil now made calcareous, is as favorable as possible to the growth and increase of this plant. Mr. L. computes the labor caused by wire grass to be equal to one-fourth of the whole tillage and management of his crop of corn. His most laborious operation is conducted in the following manner. When breaking up the land in December, the ploughmen mark every spot of wire grass turf by setting up small sticks, which are provided in great numbers for the purpose. These marks are necessary, because when the soil is well turned 5 to 6 inches deep (5 preferred to a greater depth,) the wire grass can scarcely be seen until it begins to grow, which is late in the spring. In the latter part of winter, and whenever the earth is fit for the operation, men dig up the long roots with three-pronged hoes—such as are described and recommended by Taylor, for digging, and loading with coarse manure. These tools are made strong, and are admirably suited to taking up the wire grass. The roots which are thus obtained in great quantities, are shaken clear of the soil, heaped when dry, burnt, and their ashes scattered on the land. At this time, they are carted off and thrown into a small piece of adjacent marshy ground. The burning, or throwing away of so much vegetable matter, which also could not be entirely cleared of the rich mould in which it grew, seemed to be a waste of materials for manure not according with Mr. L.'s general practice. But he considers wire grass roots as but a poor litter—and when he formerly tried it for manure, its life was never entirely destroyed, before it was carried out to the field to increase the stock already growing there.* Six men were engaged in this job at the time when these observations were made, and they had still ahead of them a large portion of the field thickly marked by the sticks which directed to the concealed enemy.

Mr. L. has his seed corn prepared in a manner which he finds effectual in preventing crows from eating it. They will make a sufficient examination throughout the whole field, and then move off to some other place offering better fare. The same means however are not sufficient to guard against blackbirds. The seed is treated in the following manner:—To a convenient quantity of corn pour hot water, keeping the corn well stirred as long as the water is pouring on. The water may be almost boiling without injury, if the corn is kept in motion. After standing in the water about twelve hours, the corn is drained by being placed in baskets, and then spread on a table. Tar, and sturgeon's oil (or train oil) are then well mixed with the corn, in the proportion of two pints of tar and one of oil to three bushels of corn. Enough quick lime is then added to cover the grain, and be fixed by the tar and oil: and finally one gill of pounded sulphur is well mixed with each bushel of corn.

Wheat. The quantity of seed given is only three to three and a half pecks to the acre generally—and only a bushel for the best, or the stiffest soil. Thicker sowing considered injudicious on soil so light. An observer riding through the fields at this time, would not suspect that so small a quantity of seed had been given, as the growth looks thick enough, as well as very luxuriant. Many parts of the field now appear as if the crop would lodge. Mr. L. supposed that some of the best spots will produce at the rate of thirty bushels to the acre. His lodged wheat is cut with reap hooks.

The land manured for corn is kept in beds through the cultivation, to prevent as much as possible exposing the manure. For the same reason, the wheat is afterwards sowed on the surface, and covered by small (double shovel) ploughs. All the other land is ploughed before sowing, with two horse ploughs, throwing several corn rows into one flat bed, and the seed is then sowed and covered with harrows. The slight covering of the seed is not supposed at all injurious to the crop. The beds formed in ploughing for wheat, are not needed (except in a few situations) to keep the land dry, but are useful to direct the sowing of clover seed.

Turnips and other succulent crops. Mr. Lewis decidedly prefers turnips to any other root crop. He supposed his usual product of turnips, (without a bad season or some other serious disaster,) equal to 800 bushels the acre. He does not believe that turnips (in this country) deserve to be considered as an improving crop, as they are held to be in England: and neither does he concur in the general opinion entertained among us, that they are extremely exhausting to the soil. To support his defence of this plant, he showed the land now in wheat, which was manured by summer cowpens in 1831, and only part of which was put in turnips, and the whole in corn the following year. The wheat on all is very fine, and perceptible better on the part which was not under turnips: but the difference is so small, as to sustain the opinion that the injury caused by the turnips, bears no comparison to the value gained from that crop.

Parsnips and carrots are also made in smaller quantities, to furnish juicy food to milch cows, &c. after turnips are unfit for use. Carrots require much richer land than turnips. Some rich lots of orchard grass, and lucerne also are kept for green feeding before clover is enough advanced. None of these crops except the turnips occupy any part of the four fields, and therefore do not affect the general rotation, nor come within the range of my inquiries.

POSTSCRIPT. A subsequent visit to Wyanoke (May the 13th) has enabled me to supply some deficiences in the foregoing memoranda, particularly as to the management and uses of *clover*. A few years only have passed since the establishment of the fact that the profitable field culture of clover was possible in the tide water district of Virginia,

* A farmer on hilly land can use wire grass advantageously to lay on his numerous *galls*, where the soil has been entirely washed away. As wire grass cannot grow on very wet land, the roots if heaped in a wet pit surely would die and rot. The green roots contain much saccharine matter, and are eagerly eaten by hogs, and also by mules when thrown into stables.

except on some soils of rare and peculiar qualities. Even now, it is far from being generally known that calcareous manures (and nothing else without them) will serve to remove the general incapacity of our lands to produce clover—and will make that crop safe and valuable, even on some of our most worthless natural soils. The methods for making clover hay in the northern states, and in England, are unsuitable for us, not only because of the difference of climate, but also of our cultivation in general. When our clover is ready for mowing, we are pressed with the heaviest and most essential part of the tillage of our largest and most important crop—corn. On this account, it is not so important for us to make hay of the best possible quality, as to obtain the greatest value in quantity and quality combined, for the limited amount of labor which we can then devote to that purpose. For these reasons, as well as the very limited extension of the clover husbandry among us, I hope at least to be useful to novices in this business, by stating the experience and opinions of a farmer who has had to contend with every common obstacle to the production of this important crop.

Mr. L. saves his clover seed from the second growth, (after once mowing,) of the second year of the grass. The dry heads are gathered by a simple utensil, the operating part of which is merely a short piece of plank, having the end cut into a comb-like form: the long slender teeth allow the stems to pass between, but break off and save the heads, which fall to pieces at the same time. The seed thus saved are not only cheaper, but they come up better than the clean seed brought for sale from the northern states. They are sown in February and the beginning of March on the wheat land.—No harrow or other means of covering the seed is considered necessary. To distribute them at the proper rate to the acre is the only difficulty—to surmount which, the lengths of the wide beds are measured as often as necessary, to fix their extent nearly—and each seedsman scatters over a certain assigned space, the proper measure of seed. If he leaves a remnant at any one trial, he will know better how to suit his casting to the next piece of land. A flour barrel of seed in the chaff, pressed in very lightly, is equal to a gallon of clean seed, which is our usual allowance for an acre; but Mr. L. thinks that quantity too small for good sowing, and gives 1½ gallons, or 1½ barrels in the chaff, to the acre.

The next year, mowing begins early in May, for green food for horses and mules. It is generally thought that green clover is weakening and injurious to working horses and mules; and some of us who hold a contrary opinion, are yet compelled to yield to the prejudices of our overseers, that we may deprive them of the ready excuse which green clover feeding would furnish them for slow and insufficient ploughing, or poor teams. Mr. L. has a day's allowance mowed in the morning, which is thrown into small heaps as soon as it is clear of dew. This is used for feeding at night and the next morning. Two well filled horse carts are brought up every night and used at the two feedings. The long food for mid-day is always of dry fodder. Corn, as usual, is given at every time of feeding, but less is eaten, from the greater relish of the horses for the clover. So far from any injury being sustained, the horses seem to improve from the use of their green food. It should be mentioned that one or two of the work horses are generally not at work, and this share of rest they have as they most need it. At other times all are at work together. The second growth is never mowed for green food, as its salivating quality makes it always hurtful.

Owing to the very succulent nature of clover, and the variableness of our weather, there is much risk in curing clover hay. With all the care that can be used, the thin leaves will generally become crisp, and fall off in the various handlings of the hay, before the large sappy stalks are enough cured to stack. If a soaking rain or even heavy shower falls, the best made cocks of clover hay will be so penetrated with wet, as to require all the trouble and loss of drying. After sustaining much loss of labor and of crop from these causes, Mr. L. has adopted a method which he has found to save a deal of labor, and on a general average, to furnish better hay. His mowing for hay goes on in any weather, except it is raining too heavily for laborers to be out of the house, or unless the earth is full of water. Three swaths are raked into one high ridge, immediately after mowing, if clear of dew, or as soon afterwards as the dew has dried off. This operation substitutes all the usual and various labors of opening, turning, putting into cocks, &c. The rows remain, taking the sun and rain, until the hay is cured, which may be in five or six days of common weather, and has been as long as ten in the worst. The surface is so burnt by the sun as to cause the row to appear to be ruined by the exposure; but the injury is only superficial, and that cover protects what is beneath. If rain comes, as usually happens, the whole row is made completely wet, but it is thin enough to dry afterwards without mowing. When cured, it is thrown into small cocks, which facilitates the loading of the wagons, and also serves to air the hay, and remove any remaining dampness. If the weather is good, the hay is moved without delay to a house where it is packed away, or otherwise put into large ricks containing from 12,000 to 20,000 lbs. of hay, and which are covered thickly with straw. If the weather is threatening, the cured hay is put into small stacks until it can be put into the house. From the description of this mode of hay-making, it might well be supposed that the hay would always be bad, and generally worthless as food. But Mr. L. has commonly made better hay in this manner, than when he used much more care and labor—and has never entirely lost any, from the worst of weather. The weather can scarcely be expected to be worse for hay-making than in 1830, yet his clover, which passed through that trial, made what might be called hay of better than middling quality.* In general, the leaves remain on

* After hearing this statement from Mr. L. I accidentally observed his memoranda of the circumstances referred to, as we were looking into his diary for some other facts—and, with his permission, I took the following abstract, relating only to the weather and other circumstances connected with the hay-making.

"1830—May 30.—Heavy rain.

"*June* 1.—Began mowing for hay. Weather still very threatening, but no more time can be spared.

"4th.—A very great fall of rain.

"5th.—The earth so saturated with water, that no field work (nor mowing) could be done.

"6th.—Rain threatening through the day, and at

the stalks, and the greater bulk of the hay retains its green color.

Though the general plan of the rotation is to mow the clover the year after wheat, yet the mowing never extends over the whole field, for want of time and labor for so heavy a job. The balance of the field is grazed.

Summer fermented manure.—Much the greater part of the manure is made during the colder part of the year, because there is neither enough litter left, nor enough spare labor during the warmer months, to profit fully by the supply of animal matter furnished by the stables alone. The use of litter on summer cow pens would be rejected, even if it was more abundant, as a wasteful application, from the certainty of great loss from fermentation. Still some loss from fermenting bulks of manure must necessarily be suffered. When all the fermented (or ricked) manure is carried out in April, the cow pen is moved to the land intended for corn the next year, and littered; and the cattle remain there the short time that intervenes before the naked penning is begun. This litter will be too dry and too poor for early heaping; but when wet weather allows the stable dung pit to be emptied, its contents are carted to the cow pen, and a rick formed, as was before described, by using alternately layers of the two kinds of manure. This has not yet been done: but the pit was full of dung, and flooded with water from late rains. This is the proper state of things for the operation of ricking.

The scarcity of litter in the stable during summer, prevents the heat that would otherwise take place, and no inconvenience is sustained by the horses from that cause, between the times when the stables are emptied of the manure. In dry weather, the water in the pit settles to the bottom, and the upper part of the manure would suffer by becoming too dry. To prevent this, five or six holes are dug through the dung to the bottom of the pit. In these the water collects; and every morning it is thrown over the top of the manure, which is quickly done with broad paddles.

The heaping of the litter of the pens where beeves and milch cows had been kept until lately, was going on, which gave me an opportunity of witnessing the great superiority of the three-pronged hoes, and three-pronged forks to our common tools, for moving coarse manure. Few, perhaps, would consider the use of these tools of much importance from any description of their advantages; but whoever sees them used for five minutes, will determine never again to heap, or load with manure, without their aid. This manure, though coarse, (being principally corn-stalks) was rich from the fat animals kept on it, and the richness of their food, and was quite wet. I should expect it to suffer from *fire fanging*, the effect of violent fermentation; but Mr. L. entertained no such fear. This, and the other ricks that the stable dung will help to form, will be used for turnips.

It is remarkable that Mr. Lewis's fields are no where infested with blue-grass, which is the worst of plagues on most good loams, and especially after liming. It is true that this grass thrives best on soils that are both moist and somewhat adhesive, as well as of good constitution. If, indeed, it is the want of sufficient moisture and adhesiveness that prevents this grass growing on any spot here, the fact furnishes stronger evidence of the dryness and sandiness of the soil, than would be inferred from my description. Without drawing that inference, I merely state the fact.

Partridge peas, which are so troublesome in wheat crops on all calcareous soils, and more so on light than stiff, are remarkably scarce on Wyanoke; but the exemption from the ill effects of this pest will not last long, as it is increasing fast on the limed parts of the land.

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night it came so heavily, that again on the 7th no field work.

"8th.—About 16 acres of clover have been mowed, and raked three rows into one—the crop a heavy one for our land. Such heavy rains have fallen, and have driven through the clover ridges, that unless we have clear weather from this time, I fear we shall have a very indifferent crop of hay. Have been five days mowing. Weather now fair, and we are putting the hay into cocks previous to stacking.

"9th.—Fine day for hay-making, since the last clearing off, but unfavorable to corn, being uncommonly cool. For five days past, the thermometer has been each morning as low as from 52° to 54° in the shade.

"11th.—Fine morning. Thermometer 65°. Yesterday hauled to hay house 25 loads. This day we continue—2 more loads to the house, and 12 to the stack. Next day finished the stack with 7 more loads, or 19 in all."

CULTURE OF THE VINE.

(From Proceedings of the New-York State Agricultural Society.)

Extracts from a Letter from Le Ray De Chaumont.

PRESSIS, NEAR VENDOME IN TOURAINE,
J. BUEL, ESQ. *Dec.* 16, 1832.

Cor. Sec. of the State Agricul. Society, Albany.

Sir,—When I resolved, last summer, to pay a visit to my native country, I was much pained with the idea that it would deprive me for a considerable length of time of the satisfaction of uniting my efforts with those of such of the members of our State Agricultural Society as were zealous in promoting its success. However, I was relieved, when I considered how many there were in our society who could render the same service: while, during my travels and stay on this side of the water, I could make them useful by observations and notes collected on my route, upon whatever might be worth communicating; also, by connecting our society with some of those in France whose object is somewhat similar to ours. The alliance of such societies cannot but prove useful and produce improvements.

Having begun my travels rather late this year my information will not be as interesting as I could wish; but I hope, that during the other year I intend to appropriate to my stay in Europe, I will have collected facts more worthy the attention of our society. My travels have been through those parts of France, of the duchy of Bade and Switzerland, which have much analogy, in respect to climate, to that of New York.

Culture of the Vine. I will begin by the grape vines.

I am still more of opinion, since I left America, that serious attention should be paid to that important cultivation. I am more certain of the success which is to attend it in the state of New York.

I have received from the county of Jefferson, information that grapes perfectly ripe have been picked from vines cultivated in open ground, and

the letter which mentioned it reached me here when they had not yet begun their *vendages*, and were not expecting the grapes to be sufficiently ripe for several days to come. You must consider that I am here in that celebrated country for fruits, Touraine, which is in the centre of France. They were much more backward in those countries I have just left and mentioned above, and in some parts of which wine is made in quantity.

You know how uncommonly severe and long was last winter in the state of New York, and I must observe that in this country it was one of the mildest; and the spring very fine, as well as the summer; this last season was, however, rather too dry. I was still more astonished at the comparative quickness of the growth of the vine, and the abundance of its production. It is so much in our favor, that I not only created wonder, but yet a sentiment bordering upon entire incredulity, when I mentioned the produce of a cutting planted along the house of Major Brown late in 1827, and which had produced above one hundred fine clusters, perfectly ripe in the middle of September, 1830, and more than three hundred the following year; at the same period, equally good and fine flavored; a fact which has been well ascertained by the agricultural society of the county, and published afterwards in their transactions.

My great objection and I must say the only one which I had, and even published formerly, to the cultivation of the vine, with a view of making wine, is removed by the happy result of many inquiries and observations I have made, in examining attentively a method very different from the one which is uniformly adopted in all the vineyards of the middle and northern parts of France. There nine-tenths of the work, at least, is made by the hand of man and part of it so painful and hurtful to the body, as to injure materially the workmen; while in many parts of the south, and in some parts of Switzerland, where very good wines too are made, the most painful and more laborious part of the cultivation of the vine is achieved by the work of horses and cattle. The difference is such in favor of this country, between the two methods, that I do not hesitate to say, that every thing considered and calculated, this last method, with some improvements I will suggest, will not occasion you more expense than in France, to produce the same quantity of wine that would be obtained by the other method, which would cost you nearly three times as much as in France. This result is not only occasioned by the difference of the price of labor of men in the two countries, which in the preferred method is substituted for the greatest part, by the work of animals, that do not cost more in the state of New York than in France, and which can be fed cheaper; but because this preferred method owes principally its greater produce to its having a much greater proportion of land consecrated to the same quantity of vine-stalks, and that the land is considerably cheaper than here. Mr. Thiebault in comparing the two methods to prove the immense advantage of the one he recommends, does not calculate the produce of an acre, but of the number of stalks. He says "that 2000 stalks trained according to this method, will produce nearly 26.000 gallons of wine; while on the other hand, 6000 stalks trained in the ordinary way, produce, in common seasons, only from 780 to 1300 gallons, and in the very best seasons only about 2600 gallons." This enormous difference of thirty to one, I do not warrant, but only that there is a considerable one. Mr. Thiebault adds, that the increase in quality is also considerable.

Considering the comparative value of the land you would appropriate to the cultivation of the vine, with the same nature of land in Europe, and that there is a difference of at least nine-tenths in favor of the United States, I would propose an altogether different and more economical method in the first planting of the vine. I would set the roots and wooden posts a rod apart, instead of eight feet, as recommended by Mr. Thiebault, leaving as he does, the space between for the cultivation of grain or other productions, as preferred by the farmer. The trenches, two feet broad and one foot deep, should be made with the plough and the scraper, which can be equally useful and convenient in covering the roots. Some alteration and economy could be made in the hand labor, when we take into consideration that a considerable part of it can be done by children during the vacations. on the line of that plantation I would recommend planting, in an eastern and western direction, a mulberry tree alternately with the grape-vine. The wooden post will for several years be the supporter of the grapevine, but it will probably be rotten and rendered useless when the vine will have sufficient strength to need no support for its stalk, but would require some aid to keep its lateral branches in the desired position, The mulberry tree will then answer the purpose. It must be well taken care of at all times, and will pay not only the expense but yield a handsome benefit for those who will pursue the cultivation of silk, or who have in their neighborhood some one cultivating it. At all events, their cattle would relish that food which would come for them in a very good season. The tree must be trimmed in such a way as to have one single stalk and a very small head, which when arrived at the height of about eight feet, must be regularly trimmed twice in the fine season, when its foliage is most suitable to the feeding of worms. In that way the mulberry will give no injurious shade either to the vine or to the grain or plants which are to be sown between the ranges. You will observe that in that way of planting and cultivating the vine, the cattle, as I have stated in the beginning of this article, will do the essential part of the work; and that they not only afford the greatest help for cultivation, but yet come in for the hardest share at the time of collecting the fruit. I will one day give more details upon what is to be done in the years which will follow the planting and first growth; and you may rely upon my readiness to transmit to the society what further information they can ask from me. I intend to examine more minutely this kind of cultivation, and ascertain as near as I can the real produce. Meanwhile, I think the society may boldly recommend the cultivation of the vine, chiefly in the west and north of the state. To support this advice I cannot better conclude this article than by quoting, what I notice with pleasure, in a letter I have just received from the respectable secretary of the agricultural society of Jefferson county. Among the different valuable details he gives me of the cattle show and fair which took place the 26th September last, I find the following: "A curious exhibition of the process of silk-making was interest-

ing; and Dr. Guthie accompanied his specimen of grapes with a letter, stating that the culture of the grape was as easy and certain in this country as that of raising apples, or any other of the vegetable productions."

Culture of silk. The next important article is the culture of silk. All I have seen and heard upon that subject, since my arrival in Europe, confirms me in the opinion, that the United States in general are as well if not better adapted to the cultivation of the mulberry and the culture of silk, than the most favored countries on this side of the water. The cocoons that we raised last year at Le Raysville, with so little trouble, and such an imperfect knowledge of the proper management of this delicate worm, have been much admired by those capable of judging, to whom I presented them for examination, and the silk thought of the very first quality. I have ascertained that in the duchy of Bade, they rear the mulberry tree in very indifferent soil, rather poor, and cultivate the silk with success. Certainly where the worms are educated, the season is far from being as favorable to them as it is in the north of the state of New York. I hope that the efforts of the society for encouraging the culture of silk will have been successful, and I am very anxious to see the report which will be made to the society on a subject of such vital importance.

ON GRAFTING THE WHITE MULBERRY.

To the Editor of the Farmer's Register.

SIR—We are much disposed to think those things impracticable, which we have failed to perform ourselves. A writer in the first volume of the American Farmer, (page 412,) who seems to be very intelligent, and who pronounces himself an adept in the arts of budding and grafting trees, asserts that neither walnuts or mulberries will take by grafting or inoculating. I know an English walnut tree, now living, which was grafted on a black walnut stock, about four feet from the ground. And I have several white mulberry trees, which I inoculated on the common black mulberry, after riding with the twig from which the buds were taken, as a switch, for seven or eight miles. Every one of the buds inserted, lived.

The gentleman spoken of above, who says, that "after experimenting for forty years, I have never succeeded in one instance," must have chosen improper times for his experiments, or failed in some other way, for which I cannot account.

I mention the above circumstances by no means with a view of contradicting him, but because there are many gentlemen who wish to propagate the white mulberry; and budding on the native mulberry is certainly the most expeditious mode with which I am acquainted.

Very respectfully, &c. A. B. C.

BIRDS AND INSECTS.

From the Boston Daily Advertiser.

We have already intimated our opinion, that the labors of the scientific ornithologist are of far more practical utility, than the casual observer might suppose; and that, even in the business of legislation, a regard to his researches might prevent many errors, which may much affect the public welfare. There is no denying, that there has been no lack of legislation on the subject of irrational living things; fishes have received an undue share of attention in consequence of their negative merit of being good to eat, while the beasts have been made the object of attentions of a different sort; the several towns being duly authorized to raise money to be expended as a bounty for destroying some of the least popular of the race.—Without inquiring into the propriety of this policy here, we must affirm that the legislation on the subject of birds has been marked by some essential errors, which have led to real evil. We have already alluded to the law of 1817, by which woodcocks, snipes, larks and robins were protected at certain seasons of the year, while war to the knife was declared against crows, blackbirds, owls, bluejays and hawks: these last were treated as a sort of pirates, subject to suspension at the yard arm with the least possible ceremony. It so happens that the character of these very birds has been singularly mistaken: for while the ordinance of legislation has been thus systematically levelled at them, they, on a principle which man would do extremely well to imitate, have been returning good for evil; they have been diligently engaged in extirpating all sorts of vermin, while never were the veriest vermin half so ill treated by the human race. The crow, for example, who is generally regarded as a most suspicious character, has had great injustice done him; in the spring, when the ground is moist, he lives in a state of the most triumphant luxury on grubs; he eats the young corn it is true, but it is a necessary of life to which he never resorts, except when his supply of animal food is shortened. After the corn is tolerably grown, he has nothing more to do with it: and in any stage, he destroys at least five hundred pernicious grubs and insects, for every blade of corn which he pillages from man. In the southern states he is regularly permitted to follow the ploughman, and collect the grubs from the newly opened furrow: his life is thus secured by the safest of all tenures, that of the interest of man in permitting him to live.* There is scarcely a farm in England without its rookery; the humid atmosphere multiplies every species of insect, and these birds reward man for his forbearance by ridding him of legions of his foes. By a policy like that which dictated the revocation of the Edict of Nantes, they have occasionally been exposed to the mischievous propensities of unruly boys, who, as far as utility is concerned, are not to be compared with crows, but the error of this step soon became obvious, and they are now received with a universal welcome. The hawk enjoys a doubtful reputation in the hen roost; he sometimes destroys the chickens, but with the consistency of man, does not like to see his infirmities copied by another; and by way of compensation demolishes the fox, which eats twenty ckickens where he eats one; so that it is hardly the part of wisdom to set a price upon his head, while the fox, a hardened knave, is not honored with a penal statute. How the owl came to be included in this black list, it is in vain to conjecture; he is a grave, reflecting bird, who has

* This is a mistake as to Virginia, where we have a law authorizing the county courts to give rewards for crow-scalps. The best recommendation of this law is that it is nearly a dead letter.—[*Ed. Far. Reg.*

nothing to do with man, except to benefit him by eating weasels, foxes, racoons, rats and mice, a sin for which most housekeepers will readily forgive him.

In some parts of Europe, he is kept in families like the cat, whom he equals in patience, and surpasses in alertness; hour after hour he may be seen watching for his prey, with the air all the while of being completely absorbed in some mathematical problem. Another of these birds, the blackbird, is the avowed enemy of grubs, like the crow; in the middle states, the farmer knows the value of his company to pluck them from the furrow; while other less pains-taking birds collect the vermin from the surface, his investigations are more profound, and he digs to the depth of several inches in order to discover them. When the insects are no longer found, he eats the corn, as well he may, but even then he asks but a moderate compensation for his former services; five hundred blackbirds do less injury to the corn than a single squirrel. The last upon the catalogue of persecuted birds is the bluejay; whoever watches him in the garden will see him descend incessantly from the branches, pouncing every time upon the grub, his enemy and ours. These are facts which are derived from the researches of the ornithologists: and they certainly show, that a knowledge of the character and habits of birds may be of consequence in legislation, if it should do no more than to give protection to the innocent.

We have already seen that the act to which we have referred, protects some birds certain seasons of the year; among others, the robin, who lives on insects and worms, and has no taste for vegetable diet; and the lark, who is extremely useful in his way; the only wonder is that it should have been thought expedient to allow them to be shot in any season. The quail, another of the privileged class, has no title to be named in company with the others; in the planting time, he makes more havoc than a regiment of crows, without atoning for his misdeeds, by demolishing a single grub. Nor is the partridge a much more scrupulous respecter of the rights of property; though, as he lives in comparative retirement, he succeeds in preserving a better name for honesty.

There are some other of our most familiar birds, of which a word may here be said. Every body has observed the little goldfinch on the thistle by the wayside, and wondered perhaps, that his taste should lead him to so thorny a luxury; but he is all the while engaged in devouring the seed, which, but for him, would overrun the grounds of every farmer. Even the bob'o'link, a most conceited coxcomb, who steals with all imaginable grace, though we are bound to say that he is much more attentive to our southern neighbors in this particular, than to us, destroys millions of the insects which annoy the farmer most. All the little birds, in fact, which are to be seen about the blossoms of the trees, are doing us the same service, in their own way. Perhaps there is no bird which is considered more decidedly wanting in principle, than the woodpecker; and certainly, so far as man is concerned, there is none more conscientious. So long as a dead tree can be found for his nest, he will not trouble himself to bore into a living one; whatever wounds he makes upon the living, are considered by foreign gardeners as an advantage to the tree. The sound tree is not his object: he is in pursuit of insects and their larvæ. In South Carolina and Georgia, forests to a vast extent have been destroyed by an insect, which would seem as capable of lifting a tree as of destroying it; the people were alarmed by the visitation, and sagaciously laid the mischief to the door of the woodpecker, until they found that they had confounded the bailiff with the thief. . . . .

The injury arising from the loss of a single crop is hardly to be estimaetd. The experience which is taught us by our own misfortune is very dearly bought; and we think that if we can derive it from others—if, for example, we can learn from the ornithologist, the means of preventing such injury, as in many instances we may, the dictates of economy combine with those of taste, and warn us not to neglect the result of his researches.

OXALIS CRENATA, A RIVAL TO THE POTATO.

This plant has been recently introduced into this country from Chili; and it is not improbable that it may shortly command the attention of the agriculturist as a rival to the common potato. In April last, a small tuber of the root was planted by Mrs. Hirst, of great Ropers, Warley, Suffolk, and the roots were taken out of the ground on the fifth of this month. As the habits of the plant were very little known, this lady placed the tuber first in a small pot, and afterwards in the open ground of the garden. It appears, however, that this precaution was unnecessary, as the herbage grew very vigorously, and the leaves remained,and were but slightly injured by the frost, until the roots were examined. Although the tuber planted did not weigh half an ounce, the produce weighed upwards of 4 lbs. Besides the family at Sopers, several other botanists had visited and watched the progress of this oxalis; and when a few of the tubers were boiled, all the party admitted, that, as much as they resembled the potato, their flavor was decidedly superior.—This result is very promising; and when it is recollected that our common potato, (solanum tuberosum,) also from South America, was confined to gardens more than a century, its tubers being small and watery, we may reasonably expect that cultivation can do much for the new plant. The stems were numerous, large, and diffuse; the flowers, which appeared in August, yellow and slightly notched; hence the epithet *crenata*. At present, the tubers somewhat resemble small kidney potatoes, inclining, however, to grow in an aggregate form.—[*London Paper*.

ON THE VALUE OF BURNT CLAY AS MANURE.

From the Edinburgh Farmers' Magazine.

Sir—I am much concerned to see the ashes of a friend of mine, lately the cause of considerable speculation and interest, now suffered to repose in utter neglect, and going, as it would seem, rapidly to oblivion. I do not mean the ashes of Platoff, or of Barclay de Tolly, or of any other of the illustrious men who have figured in the world, but merely those of inanimate clay, conceived at one time well adapted to assist in raising food for warriors, and all the less distinguished inhabitants of the earth.

Seriously, sir, I do think that this manure, clay ashes, has fallen into unreasonable neglect. Proba-

bly those who first manufactured, and used it in Scotland, did too much blazon it forth, and rate too highly the benefits to be derived from the use of it—thus creating in men's minds expectations that could not be realized, the disappointment of which might cause them to abandon it in disgust, neglecting the comparatively humble advantages which it really may, and, I believe, does possess.

As a ground for the favorable opinion expressed of this agricultural auxiliary, I shall, with your leave, state here my experience respecting it.

In the winter 1814-15, notices of the practice were given to the public by a Mr. Craig; and, if I recollect aright, by other gentlemen of Galloway, which excited a good deal the curiosity and interest of agriculturists in this quarter. I for one felt so much, as made me as soon as possible take a journey to head quarters, that I might see and hear all particulars concerning it.

The process of burning, I could not at that time of the season see. The effect of the ashes was visible in some very fine fields of turnips near Kirkcudbright, and more particularly at Mr. Craig's at Cally, where I saw a fine crop of ruta baga that had been produced by them; and this excellent vegetable, every one knows, requires an abundant allowance of dung, and that of good quality, to make it arrive at any tolerable perfection.

I came home, determined to set to burning as soon as the weather would admit. As the operation was imported from Ireland, I naturally inquired among laborers, natives of that country, (and of whom we have abundant store,) for a person skilled enough to undertake the job. There was not one of these worthies to whom I spoke but professed thoroughly to understand the whole process. I engaged some of them; but their performances, as may have sometimes happened with gentlemen in a higher sphere, by no means accorded with their promises:—they were dismissed. New hands came, who knew it better than their predecessors;—they in their turn found it necessary to walk off. In short, there was nothing but blundering the whole season. However, in the end of June, and by dint of fuel, I had got seventy or eighty single horse-cart loads, at an expense probably of half a crown for every cart. These were applied to part of a turnip field, left purposely, at the rate of fifty-five to sixty cart loads per acre. The turnips were sown on the 6th of July, and proved by no means a heavy crop; nor was it to be expected they would. In 1816 the whole field was sowed with barley;—that part on which the ashes were laid proved fully equal to the rest of the field, which had been dunged rather heavily. I could observe no difference of the hay crop in 1817; and this year, the appearance of the whole field in pasture is exactly similar.

In spring 1816 I was lucky enough to get a laborer who really understood what he professed to do. He burned for me, during the summer, 500 or 600 cart loads, but too late to be used for turnips. Some of these ashes, in the end of the year, were spread on a field of natural bog meadow. I dare say sixty cart loads at least were applied to an acre; but I cannot speak very precisely to that point:—whatever was the quantity, the change effected on the meadow was most gratifying. Instead of the ghost of a crop of hard coarse grasses, which was formerly reaped, I had, in 1817, a luxuriantly abundant crop, consisting of *holcus lanatus* (provincially Yorkshire fog,) and of all the finer meadow plants. In a word, I had more than three times the quantity, and the quality entirely altered for the better.

I had more land in bare fallow in 1816 than I had dung for; and when *that* was finished, I betook myself to clay ashes for the remainder of the break. The whole was in oats last year; and the division manured with ashes certainly proved not inferior to the other parts of the field. It is now in pasture, and no distinction descernible:—the quality of the soil is perfectly alike.

I prepared a considerable quantity of ashes early last summer—they were mostly applied to turnips; and truth obliges me to say, that they produced a much better crop than dung on the same field and soil. I am certain I do not overrate the superiority at 30 per cent. The field is wholly in barley this year, but in that crop I cannot distinguish the least shade of difference.

If you think that I have not already intruded too much upon your room, I shall now, in a few sentences, acquaint you with my *modus operandi*, or manner of converting the raw material into the useful article.

A considerable proportion of the farm which I possess, is, from its elevated situation, and the badness of the land, not fitted to be profitably cultivated; and it is therefore occupied entirely by sheep. The rough and coarse boggy part of it is the place whence the ashes are procured. The soil a stiff clay incumbent on a stiffer till. This, after being properly marked out, is cut by the spade into slices of about a foot in length, eight or nine inches in depth, and three inches in thickness. These pieces are then set up by the hand, and allowed to stand to dry for a week or longer, according to the weather. When in tolerable order, they are burnt in kilns, formed in the manner which has already been too often described to need repetition here. The earth, thus prepared, consumes incomparably quicker than that burnt without any previous process. I have now given up the use of the subsoil, as I think it cannot afford ashes of equal fertility with the surface earth. The land used of the nature I have described, is only injured for a year or two, as it soon regains a sward, when sown with rye-grass seeds, and covered with a few of the ashes. Indeed, it is rather improved than deteriorated by the operation. An esential part of the business yet remains--the expense; and on that head I can speak positively. The ashes have never yet (the first year excepted) cost me more than 6d. each single-horse cart load; generally they amount to 4d.; and this season I am certain they will not exceed threepence.

I hope I have now satisfied you that I at least have reason to think well of these respectable ashes; and shall only add, that I would be much pleased if any of your correspondents or readers would take the trouble of giving us the result of their experience on this subject. I am, sir, &c.

Annondale, 13th July. J. H. S.

ON POWDERED OYSTER SHELLS AS A MANURE

From the Edinburgh Farmers' Magazine.

SIR—An important discovery has recently been made in the preparation of oyster shells *as a manure*, the particulars of which, from respectable

authority, I enclose, to be inserted in "The Farmers' Magazine." It is an article that has hitherto been much neglected in Scotland—though it would seem well entitled to attention. The propriety of applying this manure depends much upon the different effects of mild and of caustic lime. It is well known that mild lime may be safely applied in cases where the land has been exhausted by the use of caustic lime; for instance, the scrapings of roads, made of limestone, though the caustic lime from that very stone would be injurious. Mild lime has been advantageously used, mixed with dung for potatoes, and, instead of rendering them scabby, improves the crop. Mild lime may likewise be used in compost with dunghills; and it does not, in that state, injure the dung, as caustic lime would do. Pounded oyster shells, consisting entirely of calcareous matter, would evidently be more useful than scrapings of roads or pounded limestone; more especially as, with the shells, there may be a small mixture of saline particles, or of animal matter.

I hope that some spirited agriculturists will be induced, from these hints, to try some experiments with powdered oyster or other shells; and to communicate the result to the public, in your valuable repository. I am, &c. JOHN SINCLAIR.

Ormly Lodge, Ham Common, Surry, 24th Sept., 1818.

Extract of a letter from Mr. Blaikie, of Holkham, to Sir John Sinclair, dated 18th September, 1818.

Oyster shells, pounded or bruised, (without having been burned,) were first used upon Mr. Coke's farm, as a manure, in the year 1816. In the summer of that year, the experiment was tried upon a hungry, light, sandy soil, which had been cleaned for turnips. The oyster-shell dust, or powder, was drilled in the usual way, upon twenty-seven inch ridges, at the rate of forty bushels per acre, (without any other manure) was slightly covered with earth, and the turnip-seed sown upon it. Another part of the same field, quality of land equal, was manured with farm-yard dung at the rate of eight tons per acre, put into the same sized ridges, and sown with turnips-seed as before described, (no other manure having been applied.) The turnips proved a good crop on both pieces; nor was there any perceptible difference in the bulk, (but the produce was not weighed.) The turnips were all eaten upon the ground by sheep; and the succeeding crop (barley) was good on both, and apparently equal; but the produce was not thrashed separate. The seeds, or *layer*, (crop of clover,) in the present season (an. 1818) is a good plant, and appears equally so. It is eaten by sheep.

In this experiment, so far as it goes, it appears that forty bushels of oyster-shell powder is equal in virtue as a manure, to eight tons of farm-yard dung, at least for the purpose to which it was applied.

In the autumn of 1816, pounded oyster shells were tried as a manure for wheat, in competition with rape-cake powdered. The experiment was upon a one year's clover layer, the wheat sown after one ploughing—the soil a kind, light, gravelly loam. Oyster shell powder, at the rate of 4 cwt. per acre, was drilled with the wheat seed on one part of the field, and, on another part, (of the same quality) rape-cake dust was drilled with the wheat at the same rate per acre as the shell powder: no other manure was applied to either part. The crop of wheat was good, nor was there any perceptible difference *upon the ground*; but the produce was not thrashed separate. A similar experiment was tried upon the same wheat field, *the manure applied at spring*. The operation as follows. The wheat seed was sown, *without any manure*, in the autumn of 1816; and in the spring of 1817, rape-cake dust, at the rate of 4 cwt. per acre, was *drilled* between the rows of wheat; at same time, an equal weight of shell-powder was applied in like manner to another part of the field. The result of this was similar to the autumn experiment, viz. there did not appear to be any difference in the crop produced upon the shell-manure from that on the rape-cake.

The field on which these experiments were tried, is now in turnips; a good crop, and exhibits no difference where the manure, as before stated, had been applied for the wheat crop.

These experiments are satisfactory, *so far as they go*, but certainly not conclusive; because the powder was, in no one instance, either weighed or measured; this I very much regret. But it appears to be almost impossible to conduct such experiments with a requisite degree of accuracy, upon a farm establishment of such magnitude as that of Mr. Coke at this place. For, during the hurry and bustle incident to collecting the harvest, the farm-manager has so many important concerns to attend to, that he cannot devote any portion of his time to superintending experimental objects; and were he to depute the management of such concerns to the laborers, it is not to be expected that they would pay the attention requisite.

I believe Mr. Coke intends to continue the experiments on oyster shell manure, and to extend it to top-dressing for young clovers, permanent pasture, &c. &c.

The oyster shells are here broken to pieces by passing them through the oil-cake crusher; or are bruised by repeatedly drawing a heavy iron roller over them, when spread upon a stone, or hard burned brick-*on-edge* floor.

I give it as an opinion, that oyster-shell manure is likely to answer for gardens. particularly to rake in with onions, and other small seeds. I also think it may prove beneficial as a top-dressing for grass plants, to destroy moss, and prevent worms from casting. If these ideas are well founded, there will be no difficulty in disposing of any quantity of this manure amongst the gardeners, and the citizens for their grass-plats in the vicinity of London.

ON MANGEL WURTZEL.

To the Editor of the (London) Farmer's Journal.

Surry, June 2, 1823.

SIR—Seeing two papers on mangel wurtzel, which is an excellent thing in its proper purposes (but totally incapable of fatting any animal) if you want to fat any stock, you must cultivate the sugar beet, for that variety only will produce the desired effect, I beg leave to mention a practice of my own, which the severity of the last winter sufficiently puts to the test. Your correspondent, Mr. John Hall, says much in favor of housing, which is attended with an enormous expense, especially if the crop be at a distance from home.

Having last year raised eight acres of drilled

mangel wurtzel, on a down of deep mellow sand over chalk, two mi'es and a half from my home-stall, in November I caused the roots to be drawn from the drills, and I made a three-bout ploughing, turning the furrow outwards from the middlemost drill. I went twice in every furrow, to throw as much earth outwards as I could, and when I came to the middle furrow, I caused the plough to go three bouts in it, and thereby excavated a broad double furrow about thirteen or fourteen inches in depth. I then caused all the roots that stood within a rod in some instances, and in others within two, and in others within three rods of the furrow, according to the thickness of the crop, which had partially failed through drought, to be drawn by hand, and the earth to be loosely shaken from their roots, the leaves to be pulled (not cut) off, by a man seizing nearly half the leaves in one hand, and half in the other, and pulling them contrary ways, so that the centre of the crown was left uninjured. I caused the roots to be then thrown over by hand into the deep furrow, as many as were within distance to be thrown, and those that were more remote, I caused to be carried thither in baskets and aprons. I then caused a person to go along the line, placing evenly in the furrow such roots as had not been thrown exactly into it, and reducing to a more horizontal position those roots which had fallen in. I then ploughed back the three bouts upon the roots, going as deep, and throwing up as much soil as my plough, with a strong two-horse team, in a finely pulverized soil, could carry. And after this I applied a very cheap and simple tool, consisting of three boards of equal length, about a foo' wide and three feet long, forming an equilateral triangle, with two old plough handles fixed on each side of the apex or point, to drive it by; and having a board at the base a little inclined to the horizon, the most projecting edge being downwards, so as to plough up, or scrape up the mould before it. Near the two ends of this front board, were fixed two staples, to which I hung the hooks of my chain traces, and so drew the machine forward with a horse. The use for which I constructed it, was, to cover in the dung in my drills for turnips and mangel wurtzel, which end it answered excellently; but, on this occasion, I applied it first to one side of the ridge in which I had buried my mangel wurtzel, taking care to keep the side of it which was over the centre of the roots elevated as much as I could, and depressing the outer side of it with all my strength. The effect was, that by driving the horse forward on one side of the ridge, and back on the other side of the ridge, I brought the soil to the shape of the roof of a house, perfectly smooth and regularly bevilled. The first hard storm that fell, beat the sand to a close consistence; and from that time forth, it shot off nearly all the rain. The frost did not in the least degree injure the roots. I had not an injured root in 20 yards, when I came to open the drills; and the loss of those few I cannot impute to frost, but to accidental bruises: the only drill injured, was one in which I imprudently persisted to put in and cover up the roots, during a very hard pelting shower; and of this ridge a great proportion was rotten. I ate the whole crop with great profit, with ewes and lambs, in the month of March. It is an excellent food for the ewes, they were particularly fond of it, and they all did kindly and well on it, and the lambs also did well. (They had hay with it.) If I had carted that crop home, I could not have brought home in each cart three loads a-day; and all my teams would not have brought it home in six weeks, omitting all other work. I know not whether I imitated the thought from the Norfolk mode of burying turnips, or where I got it; but sure I am, that it is cheap, and answers well. A cleverer ploughman than I am, could perhaps spare part of the labor. I only mention, that my plan, inartificial as it might be, perfectly succeeded.

I am, sir, your most obedient servant,

A SURRY FARMER.

☞ To the assertion here made that mangel wurtzel will not fatten stock, another correspondent (Thomas Herod,) makes the following reply:

"Your *Surry correspondent*, in a recent letter in your Journal, is very much mistaken respecting the fattening qualities of the mangel wurtzel. I heard a respectable grazier state, in a public market, that he made a quantity of beasts fat this last spring with these roots in the shortest time he ever saw any fatted before with any thing. I have some friends who have regularly fatted beasts for the London market several years, who all concur in the same opinion. I feed my cows, horses, and pigs with them, and find them very nutritious.

I am, sir, your's respectfully,

THOS. HEROD."

WORMS AND ROOKS.

To the Editors of the (London) Farmers' Journal.

May 28, 1823.

SIR—Having been a considerable sufferer from the wire-worm, I wish to say a few words about what I consider to be the principal cause—1st. Sowing down with rye-grass to lay two or three years—2d. After ploughing it up in the winter, using the scarifier during the summer instead of the plough, so that the moist earth a few inches down in which the worms lay was not turned up to the surface, that the birds and rooks might devour them.

Many a time do I remember seeing the rooks sail over the farm in immense numbers of a morning, and some of them would alight and look on us, but not stop, because there was no job for them. What an immense number of those little reptiles would these rooks have devoured if the plough had brought them up to view, and though small, they would have been as perceptible as the large common worm, because of their motion. I have seen farmers alarmed if a number of rooks alight on the land at oat or barley sowing, and send them off as quick as they can; and I have done so myself when I was younger, and even taken out the gun for that purpose; whereas I ought rather to have invited them as my best friends; and as for the seed, they wanted no dry corn, as long as they could find worms. I do not know, sir, what effect salt or soot in large quantities might have, but I despair of any benefit from small ones. I should be obliged to any of your correspondents for information.

In such parts of the country that those large flights of rooks go over every morn and return at eve, if the land suspected of wire-worms were ploughed in small furrows late in the autumn or

early in the spring, after or before the general ploughing is done or begun, so that the rooks were in want of a *job*, they would come down in great numbers wherever they saw the land fresh turned up, and would do a very great service.

If the lands were short, the plough should do two lands at once, about on one, then the other, to give the rooks time. Some of your readers, sir, would laugh at this; but I am a very great friend to rooks, and would rather have a rookery near my farm than a preserve full of game, and myself the only lawful sportsman thereon; for though they are destructive at times, where the farmer is not acquainted with the best method of sending them "over the hills and far away," yet they do invaluable service where insects abound.

METHOD OF ATTRACTING RATS AND MICE.

From the Edinburgh Farmer's Magazine.

MR. BROAD, a farmer at Thruxton in Herefordshire, has at last published his method of destroying rats and mice; and, as we understand that he has received a public reward for the discovery, there is every reason to suppose that the means he has adopted are effectual. We therefore propose giving an abstract of the plan he has recommended, as any mode of destroying such pernicious vermin cannot be too generally made known.

The first object to be attended to is the trap, which differs but little from the common box-trap. The size most approved of by Mr. Broad is two feet long, eight inches wide, and nine inches deep, inside measure. If it be either longer or more narrow, the rats will not enter it so freely; and if it be shorter, the danger of their escape after having entered, and of being struck by the falling doors, may be increased. In each door there is a grate, made of iron wire; for the old rats would soon destroy either brass or copper. This grate should be four inches wide; it is intended to attract the rats when taken to the light, and to prevent their injuring other parts of the trap with their teeth. The bridge upon which the rats tread, to occasion the falling of the doors, should be made of tin, or very thin iron plate, about six inches wide, and four broad, so as to extend nearly across the inside of the trap. And the neck of the bridge should be made of a light slender bar of iron, about two and a half inches long, so as to extend about two-thirds of an inch beyond the external surface of the side of the trap, for the purpose of setting it. A thin plate of iron or tin should be nailed upon the inside of the aperture through which the neck of the bridge passes, otherwise the rats will soon spoil the trap by enlarging that passage. The end of the bridge opposite to the neck must be suspended about half an inch from the bottom or floor of the trap, by a single loop of iron wire attached to a hook fixed in the side of the trap; by which means the bridge being very loosely suspended, will move with the slightest pressure upon either side of it, and the trap will be made to strike by the weight of a small mouse.

The trap should be made of elm, birch, or poplar boards, which are without scent. The wood should be well seasoned, otherwise the boards will be subject to warp, and the doors, in consequence, will not fall perfectly.

As soon as the traps are prepared, the most proper and convenient places for setting them must be sought. These are either close to their holes, where every animal is less timid, or where they are known to come regularly for their food. Where a number of convenient and proper places for setting the traps can be had, it is advisable to set a considerable number of engines to work at once, so that much destruction may be made in a short time; for though, wherever proper attention is paid, every rat will be taken, still, when their number is for a long time slowly diminishing, the survivors grow suspicious; and it will sometimes require, in taking a hundred rats, more trouble to destroy the last five than the preceding ninety-five. Few situations, however, require more than half a dozen of traps.

The materials for attracting rats are 1st. the oil of carraways; and 2d. good pale malt, ground for brewing, and not discolored in the drying.

The proportion of the oil of carraways to the malt appears to be about 1 to 9000.

Much care must be taken in preparing and setting the traps; and the most trifling deviation from the following instructions, will often destroy all chance of success. Be provided with as many ordinary trusses of sweet clean straw as you have traps, and take from each truss a small bundle, about as much, when compressed in the hand, as will be an inch in diameter. Then take a small vial bottle, the neck of which is about one-third of an inch wide, and which contains half an ounce of oil of carraways; invert the bottle upon the palm of your hand, and then return it to its former position, letting no more of its contents escape than that which has adhered to the hand, whilst the bottle has been inverted. Rub your hands then well together, and draw the straw through them, bending it so as to render it soft and flexible. Let it then be placed lengthways in the trap and laid smoothly and evenly to cover the bridge, and every part of the floor of the trap, regularly.—Then take five half-pints of the malt; place it in a large basin; invert the vial of the oil of carraways upon the palm of the hand, and take from it the quantity which adheres as already directed; rub the hands together so as to spread the oil of carraways regularly over them; then take up successive portions of the malt in each hand, and subsequently, with both hands, rubbing it between them, that every part of it may be equally scented. Much accuracy is here necessary; for if the quantity of the oil of carraways be too great, the rats will not touch the malt till the scent is partly gone off.

Let about half a pint of the malt be thrown into each trap, by the hand of the person who has prepared it, scattering it rather regularly over every part of the floor. Place the traps then in the situation where they are to remain, and secure the doors from falling, by placing the pin just at the height they are to stand, when the traps are set. Divide each truss of straw into half a dozen parcels, and put a band around each; place two or three of these at each end of every trap, and sprinkle a few loose straws over each, so as in some degree to conceal the traps from the eyes of the rats. If the room contain any furniture, or trunk of any kind, let the traps be set behind it, if it stand near the holes by which the rats enter; or move the furniture, that it may partially conceal the traps; not so

much, however, but that the person who attends to them may be able to see whether they have struck or not, without approaching very close to them. The morning is the most eligible time for this part of the process: and whenever the doors of the rooms in which the traps are set, can with convenience be kept locked, it should be done.

The following morning the traps may be looked at; and if the rats be in any degree numerous, the whole of the malt will generally be eaten, and the scented straw entirely taken away. These must be then prepared as before, and replaced according to the preceding directions, and the traps and trusses of straw must be left as exactly as possible in the order they were at first; for the rats are suspicious of the least innovation.

The floor of the traps must be kept constantly covered with a proper quantity of scented straw; for although the chief attraction to the rats appears to be the combination of the scent and taste of the oil of carraways with those of the malt; still they appear to be very highly gratified by the perfumed straw, and where they can be watched, they will be seen to move about it with much apparent pleasure.

After three portions of the prepared malt, which have been put into the traps, have been eaten in as many successive days, the rats will have acquired sufficient confidence to enter the traps without distrust, and catching them may then commence; but then the traps must be previously baited again, and the straw, if wanted, be renewed; and every thing must be made to appear, as nearly as possible, in the situation it was, before the traps were set. In baiting them, the hand of the person who has been preparing the malt, and which will, of course, be strongly scented, must alone be introduced into the traps.

The morning is generally the best time to commence catching, as the rats may be most conveniently taken out during the day; but if they have been harassed, and are in consequence shy, few, or perhaps none, will enter the traps till the approach of night. Where they are not accustomed to much noise of any kind, they are alarmed by it; but in great towns, where they are accustomed to noise of every kind, they are quite regardless of it.

To take the rats from the traps, a long and rather a slender bag, made of some thin material, which will admit a moderate quantity of light, must be provided; and into this the rats will be easily driven from the traps by introducing a slender stick through the wire grate at one end of the trap, and raising the door at the other end to which the bag is applied. During this, or any other operation, the hand must not, on any account, be introduced into the traps, unless it be previously scented; else no further success must be expected: even the part of the little stick which is introduced through the grate of the door, ought never to be touched with an unprepared hand.

Particular care must be taken not to hurt the rats in taking them from the traps; for their cries never fail to excite terror and mistrust to all in the vicinity, and will generally prevent any more being taken within the succeeding twenty-four hours: it will therefore be proper to take the rats to some distance to destroy them. The greatest degree of precaution should also be used not to suffer a rat to escape after being taken, for animals have generally powers of conveying their apprehensions of danger to each other, though they do not seem at all capable of informing each other of the form or nature of the enemy, or the sort of danger, apprehended.

The traps will require to have a small quantity of prepared malt thrown into them each day, and it will be necessary to renew the scented straw once in five or six days. It is always advantageous to take out the rats as soon as possible after the traps have struck; and therefore when the rats are numerous, and have entered the traps freely, it will not be eligible to let them remain set, when they are left for the night; because few rats only can be taken by the traps during the night, when they are not attended, and the remainder come more boldly into the traps the next day, if they have had full liberty to enter the traps during the preceding night with impunity, than if, during the same period, they have seen one of their companions laboring in vain to break through the bars of his prison. But when the number remaining is small, and the destruction of a few rats comparatively important, the traps may remain set during the night; and it will not unfrequently happen that a rat, having been struck by the falling doors, or otherwise rendered suspicious, will not approach the trap till late in the night, when all is quiet.

If there be any cats about the house, or buildings, where it is proposed to take the rats by the preceding means, those should be previously confined, or taken away; for they will otherwise often approach, and sometimes enter, the traps; and when one is taken, it communicates a scent to the trap, which will render it wholly useless, till it has been exposed some time to the air, and rescented. Dogs should also be prevented from approaching the traps; and no person, except those employed previously in baiting and setting them, should be permitted to touch them; for animals of many kinds probably distinguish individuals of the human species, from each other, by their scent and smell; and the rats, after part of their number have disappeared, will sometimes take alarm at a stranger; and it will on this and other accounts be desirable to select such places for the traps, whereever that is practicable, as can be secured by locks.

For the destruction of mice, the following measures are recommended.

The trap to be used for that purpose, is similar in construction to those recommended for rats, but much smaller, being only 7½ inches long, 3½ inches wide, and 3½ inches high, inside measure. A dozen of these traps, if constantly set, and properly attended to, will be found fully adequate to keep a very extensive house and granaries wholly free from mice, and to diminish greatly their numbers in the barns of the farmer. For the latter purpose, however, traps capable of taking many at once, or of perpetually acting, might probably be invented, and employed with much advantage, for the mouse which frequents the barn is a very simple animal, and is very powerfully attracted by the ingredients, which will be recommended. As a bait for this and the long-tailed field mouse, take about half an ounce of rich cheese, toast it moderately without burning it, and then put upon it, with a slender feather, or the point of the finger, a very small quantity of oil of carraways, one tenth of a grain will be sufficient for each trap. The bait thus prepared should be put upon the

bridge of the trap whilst warm, and two small spikes should be there fixed to receive and hold it. When the traps are to be set in the garden, or forcing house, where the short-tailed field mouse often does much injury, it will be proper to place a piece of carrot under the scented cheese; for this mouse, the only remaining mischievous species, is not fond of animal substances, though it appears as strongly attracted by oil of carraways, in combination with its favorite food, as any of its congeners. In buildings of every kind, the trap will succeed best if placed close against a wall, and at a small distance from the passages through which the mice are supposed to enter, as recommended for rats; but it will not be necessary to mask the trap at all, nor to bait it previously to being set.

In a case where so much precision is required, as in taking rats, the causes of failure are numerous: the oil of carraways may not have been good of its kind: the malt may not have been proper: and it is the scent of this substance, in combination with that of the oil of carraways, which appears to attract the rats. Even the quality of the straw is very important; for as the oil of carraways must be used in an exceedingly small quantity, it is easily overpowered. But the evidence which the author has adduced of his own success, he trusts, is unquestionable; and he has no doubt that any person who attentively follows these directions, will not be disappointed.

The annual value of the crops of wheat and oats, alone, of the British European empire, cannot be less, the author observes, than 25 millions sterling; and of this, at least one fiftieth part, upon the lowest calculation, is eaten or destroyed by rats and mice. The public loss, therefore, in these articles alone, is at least £500,000 per annum, exclusive of the damage done in ships, in storehouses, and buildings of every kind. The advantages to be derived therefore from the adoption of this plan, can hardly be sufficiently estimated.

Copy of a letter from T. A. Knight, Esq., of Downton Castle, to the Rev. J. Duncumb, Secretary to the Herefordshire Society.

Downton Castle, Feb. 18, 1812.

Dear Sir—In compliance with the wishes of the Agricultural Society of Herefordshire, Mr. Broad of Thruxton has been here to afford me an opportunity of witnessing the very extraordinary powers which many respectable inhabitants of Herefordshire have stated him to possess, of attracting or taking rats; and I am happy in being able to inform you, that his success has been most complete, though he had to contend with more than ordinary difficulties. The rats in my house and premises were not very numerous; and they had been much harassed, and many had been killled, and the remainder rendered shy and suspicious: and, as they had access to my scullery, kitchen, and stables, they were probably well supplied with food of various kinds. I imagined that under these circumstances they could only be taken at night; but Mr. Broad desired me to appoint any hours of the day which were most convenient to me; and by my appointment he commenced his operations about the middle of the day upon Thursday last, the 12th.

Five box traps, nearly of the ordinary construction, being set, were examined by me about two o'clock, and the five traps contained fifteen rats. These were taken out, and the traps in succession set again; and as soon as I had seen the rats killed, I returned again to the traps, when I found the falling doors of all down, and seven rats enclosed. Upon these being taken away, the traps were set again, and within less than 20 minutes nine more rats were taken; when the traps were removed to be baited again. During the succeeding 36 hours, the rats continued to enter the traps, though more slowly; and upon Saturday morning 59 rats had been taken. Mr. Broad then returned home, leaving the traps properly baited, and informing me that he believed the extensive drains about my house and buildings still contained ten or a dozen rats, which would come to the traps; and, within the succeeding 24 hours, eight more rats, making in the whole 67, were taken. Subsequently not a single rat has been seen or heard about my house; and all my people agree with me in thinking, that not one remains alive here. Some of those destroyed were young; but much the greater part were very large and well fed, and apparently very old.

There appears to be no difficulty whatever in the management of the traps, or skill required to make them; and I cannot but give my opinion decisively, that, by the means Mr. Broad employs, rats may be, under almost all circumstances, effectually destroyed in a very few days; and I believe this species of animal might be almost exterminated, for they appear to lose all their native sagacity, and to enter the traps with the blind stupidity of moles.

I am, dear sir, &c.

THOMAS ANDREW KNIGHT.

SPECIFIC MANURES—CLOVER—FIELD PEAS.

May 18*th*, 1833.

To the Editor of the Farmers' Register,

Sir:—I have long wished the publication in eastern Virginia of a paper similar in character with that which the prospectus of the Farmers' Register indicates. From it I confidently anticipate important improvements in our agricultural operations, as well as an increase in the fertility of our farms, surpassing what had (until within a few years.) been hoped by the most sanguine proprietor. Under that excitement, and perceiving that you invite the transmission of agricultural notices of even minor importance, I have determined to send this paper, in aid of what I deem a laudable adventure on your part—leaving it entirely in your discretion to publish or suppress it.

No intelligent agriculturist hesitates to admit that the deterioration or increased fertility of our farms depends essentially on the greater or less quantity of animal and vegetable manures spread on them, and that to increase the amount, ought to form a primary object in the operations of every intelligent proprietor—still, as valuable auxiliaries are doubtless attainable, it becomes our duty to seek after them with greater assiduity than has as yet been manifested. The resemblances in the animal and vegetable kingdoms, (so numerous and so obvious as to induce the most intelligent writers on natural history to class them as beings of the same order, and that nature passes from the one to the other by imperceptible degrees,) affords an unbounded field for investigation, and when ex-

plored will, I am persuaded, furnish invaluable instruction.

It is highly presumable when man first subjected the horse, ox, &c. to his control, as nature apparently had provided only green vegetables for their subsistence, that he, confiding in her unerring wisdom, also deemed other food superfluous; but the earliest records of history present those animals participating with their masters in the use of corn, and experience evinces that in their increased bulk and muscular strength we are amply remunerated. The dog rejects vegetables; and although he can subsist on bread, yet if entirely deprived of flesh, the food most congenial to his nature, it will be attended with a proportionate decrease of strength and courage. Birds and fish in like manner require for their maturity that aliment which is adapted to their different constitutions. The vegetable kingdom sustains the analogy. Animal and vegetable manures are congenial to the growth of every species of vegetables, and yet the locust if planted in a soil the most fertile, but defective in lime, like the dog feeding on bread, although sustaining still its growth, bears no proportion to trees of like kind on utterly exhausted hill sides abounding with marl. The pine, on the coutrary, luxuriates on soils worthless for the production of food for man or beast beyond any tree of the forest; but if transplanted into a highly calcareous soil, however abounding with putrescent vegetables, its growth announces uncongenial food, and like the sheep sorrel, it seems (from the presence of lime,) divested of the power of feeding on the abundance of manure by which it is surounded. This discrepance, common to animals and vegetables, serves more obviously to illustrate the similitude in nature's works, and should teach us that discrimination in food which experience has ascertained to be indispensable to the improvement of the animals under our immediate care and observation, is equally expedient in our agricultural operations; and as that unerring instructer has shown that vegetables spontaneous in growth are inadequate to the perfection of animals, we should infer their incompetence, when rotted, to perfect the variety of the species of plants which we cultivate; and this suggests the expediency of our exploring that portion of the earth itself accessible to us, to discover, if possible, any combinations within, congenial to the growth of vegetables, which, from their position are inaccessible to the roots of growing plants.

I am the more confident in advising other agriculturists to institute similar investigations, from an experiment with *gypseous earth*, made under anticipations of success so feeble, as barely to buoy me under the operation on one acre of land, because I then was as I now am, uninformed of the quantity of the sulphate of lime per bushel, and knew not the duration of any of its nutritious effects on the growth of clover or other grasses; but at this time, I appreciate the consequences of my trial as far more important than any other (the use of marl always excepted,) which has ever come under my observation.

Corn was cultivated in 1831, on a sandy ridge in my field, marled in 1826, and yielded from eight to ten bushels; it was seeded with wheat in October, and clover seed (in the chaff) sowed in December following, and soon after from forty to fifty bushels of gypseous earth carelessly spread on an acre. In June, the number of plants, and the growth of the clover, palpably marked that portion on which the gypseous earth had been thrown, and was to me exhilarating indeed—while the yellow and feeble aspect of the pretermitted spaces under any other circumstances, could not fail to deter every prudent farmer from adventuring a second crop of clover on a similar soil. The wheat languished and appeared neither cherished or damaged by aliment the most nutritious to clover, by which it was surrounded, and scarcely yielded a recompense for its cultivation. This spring, appearances are equally flattering, the clover being about two feet high, and a space of thirty or forty acres which was spread last fall with the same earth, fully sustains the character of this manure being the specific food for clover. How long its beneficial influence will endure, experience will hereafter determine. Annual applications of the French and Nova Scotia plaster are considered advisable. The effects of the gypseous earth used by me, are, I think, superior the second year, and far exceed any benefit which I have ever derived from my use of the imported gypsum.

On viewing the prospect before me, I can no longer entertain a doubt that every acre of my fields, (without aid from the stable and farm pen manures,) at the trivial expense of carting and spreading from forty to fifty bushels of gypseous earth per acre, may be made to produce an exuberant growth of white, red, and bird-foot clover, and I rely on the experience of others, as well as on my own, for assurance that wheat sowed on a heavy clover lay will yield an abundant crop; and as I am disposed to think that corn, aided by the stubble of the preceding crop of wheat, as well as the putrid clover, will yield as abundantly after wheat as before it, I would suggest the expediency of changing the present rotation, notwithstanding the alleged objections of the extra labor, and the probable detriment to the young clover. For the former, (admitting the fact,) ample recompense will be derived in the increase of the wheat crop, from the improvement of the soil by guarding the vegetables ploughed in, from the waste which is inevitable from the corn cultivation; and as the preparation of the field may be commenced early in September, and easily completed by the 10th of October—the harrows drawn both by the horses (then at leisure) and the oxen will sufficiently cover the sowed wheat by two operations, and complete the seeding in fifteen or twenty days. Of the effects on the young clover plants I am not fully informed. My course will be to sow the seed, (without separation from the chaff,) as I "lay by" corn or give the last tillage. The cover on the seed will protract their vegetation, probably until the foliage of peas planted from the 1st to the 10th June will afford protection from the sun.

The cultivation of field peas has so long engaged the attention of farmers, as to create a strong presumption that every valuable property appertaining to them must long since have been ascertained, and consequently, that farther speculation on their value will be superfluous. But, as there may be others as well as myself, who again and again have derived the benefit, and have not noticed, or if they have, have not systematically availed themselves of that crop for the suppression of weeds, grass, &c., and thereby greatly facilitating their sowing of wheat—to those, perhaps,

the following notices may not be altogether unimportant.

A rich mould abounding with the partridge pea-weeds, &c. was last year cultivated with difficulty, and yielded an abundant crop of corn. Early in June, peas were planted equidistant with the corn, covered with the foot, and no farther labor incurred than a slight hilling when the corn was last worked. In October, the vines were removed, and the land remained quite clean, and in the best possible condition for sowing of wheat, which was completed by a single operation of the harrows after the fluke hoe; and at this time my prospects are entirely satisfactory, and no obstacle either to cutting or gathering up the crop is apprehended. My neighbor, from land of precisely similar description, and immediately adjoining, raised an abundant crop of corn, but planted no peas. In October, the double bar share plough was used; the harrows were necessary to smooth the furrows—and after the wheat was sowed, a second operation with them was required to cover the seed, which I consider less effectual than mine, on the rougher surface left by the fluke hoe. His wheat is obviously and greatly inferior at this time; and so overwhelmingly numerous and luxuriant are the vines of the partridge pea, that I am confident he must resort to the reap hook or grass scythe for the preservation of his crop. But be that as it may, I have no hesitating in assuming that the impediments in cutting and the inevitable loss in gathering up the wheat, will far surpass in value the seed peas and the trifling labor of hoeing them—leaving in favor of my course, without drawback, a heavy amount of the most nutritious food (if fed while green, and alternated with corn) for fattening hogs; and if judiciously attended to (when pulled up for sowing wheat,) the vines are eminently valuable food during the winter, for every description of stock.

Before I close this communication, (already much longer than I had contemplated,) I must invite attention to the previous notice on the effect of the growth of the field pea on that of the partridge pea. To allege that the foliage of the former, in the months of August and September, obstructed the vegetation of the latter in the month of October, and onwards through the winter, is obviously inadmissible. To what cause then shall we assign it? I hope hereafter to read in your paper a solution of the inquiry; but in the mean time, I shall remain under the impression that the previous growth of the field pea had gleaned the pasture peculiarly suited for the nourishment of both, and left the patridge pea no resource but to await a future and suitable fecundation of the soil.

A SUBSCRIBER.

INCREASED PRODUCT OF CORN FROM MARLING.

To the Editor of the Farmers' Register.

Sir: The field on Aberdeen which came in course last year, has a slip of land from north to south, about one hundred and fifty yards wide, left unmarled in the spring of 1828, when the land on each side of it had been marled the fall and winter before; and after the crop of corn, the marled sides of the slip were sown in wheat, and the slip left unsown. Last spring, the same field was laid off four and a half feet one way and four feet the other, for corn; and about the 20th of December, I commenced gathering in that part of the field. I counted in a square six hundred hills of corn east of the slip, on the marled land, and it produced five bushels and a peck, equal to twenty-one bushels per acre. On a line, as I judged, exactly west from it, in the middle of the slip, I counted in a square the same number of hills of corn, and it produced one bushel and something less than two pecks, but say six bushels per acre. Still in the same line west, but on the marled land, the same number of corn hills in a square yielded five bushels, equal to twenty bushels per acre. For your farther information, I think it is proper I should add, that before the marling in 1828, the above named three squares counted by the corn hills, were, to the best of my judgment, of equal quality, and that no manure has ever been spread on either of them; and perhaps the difference in produce would have been greater, had the marled land, as the slip was, been left also unsown. The same course was pursued last fall—the marled land sown, and the slip unsown. I have driven down locust stakes on the corners of each square, and you have the means of being informed in 1836, when the same field will be again in corn, what is the difference in produce. I assure you it will afford me great pleasure to inform you of the result.

EDMUND HARRISON.

Aberdeen, Prince George Co.
January 20th, 1833.

The remarkable difference of appearance last year of the corn growing on these strips of land, induced us to request of Mr. Harrison a measurement and report of the products, which we knew might be relied on as being made with the utmost care and accuracy. The course of tillage previously pursued on this field was far from being favorable for exhibiting the greatest effect from calcareous manures.

We have been favored by a merchant of this city, with the following extract from the Paris Price Current:

"NOTICE TO MERCHANTS.

"Merchants who propose selling foreign tobacco, for the supply of the Royal Manufactories of France, are advised that a Concours for the purchase of the necessary quantity, will be opened on the 1st of March, and from that time to the 1st of June. The samples will be received in the store room of the Regie at Paris. A new notice will make known the day when the tenders are to be deposited, and that of the adjudication.

"The administration of the Tobacco Department think it their duty to make known to commerce the probable importance of the purchases they propose making, which will consist of about 3300 hhds. of Virginia leaf tobacco, 250 hhds. light yellow leaf Kentucky tobacco, and about 200 hhds. of dark brown Maryland tobacco.

"In closing this notice, the administration beg leave to notify the public that the finest qualities of these descriptions will alone suit their wants."

[*Richmond Whig.*

AGRICULTURAL REVIEW. SLAVERY AND EMANCIPATION.

1. *Review of the debate in the Virginia Legislature of* 1831 *and* 1832. *By Thomas R. Dew, Professor of History, Metaphysics, and Political Law, William and Mary College. Richmond. White*—1832. p. 133.
2. *Review of the Slave Question. By A Virginian. Richmond. White*—1833. p. 48.

The courteous usage of periodicals may seem to forbid a review of the two works here named, as they are themselves reviews of earlier publications. They originally appeared as articles in the American Quarterly Review—but both have since been republished as independent works, and one of them (Mr. Dew's) with important additions. Under these circumstances, and considering the intimate connexion (in whatever aspect it is viewed,) of the interest of agriculture with the existence and continuance of slavery in Virginia, we could not with propriety, and conformably to our expressed engagement, omit all notice of these works. Still, however, there are obvious reasons why we should not launch our frail bark on this stormy ocean of controversy; and we shall, therefore, confine our remarks within narrow limits, and content ourselves with presenting such extracts from both works, as will exhibit the strong points of their opposing arguments. We hope thus to aid in drawing the attention of the farmers of Virginia to the entire publications, both of which do honor to their authors, and deserve well the serious consideration of their countrymen.

The question of slavery in Virginia requires for its examination the exercise of cautious and sound judgment, a deliberate and clear view of the whole ground of the argument, and a disposition to arrive at truth, wherever it may be found, and not to support particular tenets in a partizan spirit. Unfortunately, a very different course has been pursued. Slavery affects, and deeply affects the interest of every citizen of Virginia—and in a greater or less degree, the discussion of its effects and tendencies, has engaged every pen, and every tongue. But nearly all have taken sides without a full examination of the arguments of their antagonists; and each one has been satisfied with urging and maintaining the strong positions of his party, and exposing and denouncing the absurdities of his opponents, without attending to the other points in dispute, in which he perhaps is feeble and his adversary unanswerable. The *abolitionist* can scarcely fail, when attempting to prove that negro slavery in Virginia is attended with enormous evils; and having established that position, he passes at once to the conclusion that the removal of slavery would be cheaply purchased at any cost. The *anti-abolitionist* is equally successful in maintaining the immense difficulties of the attempt, and evil consequences of his opponent's schemes, and thence persuades himself that slavery, if not a positive good, is at least an institution that admits of no remedy from legislative enactments. These strictures are intended to apply in their full extent, only to those who argue and decide without due deliberation—and certainly are not applicable to the authors of the works now before us. Yet, profound and extended as have been their investigations and views, and closely as each of them has examined the positions of his opponents, still either work taken alone, will serve as an arsenal to furnish powerful weapons to those who maintain the same truths in a partizan and fanatical spirit. Mr. Harrison (the author of the latest of these works) proves beyond dispute, that the existence of slavery in Virginia, is a great and increasing evil—and his views are presented with a degree of force and eloquence worthy of his cause, and the generous feelings it calls forth; and Mr. Dew as clearly demonstrates the utter inefficiency, or ruinous cost, of all the schemes that have been proposed for the emancipation and removal of the African race. If we can ever settle beneficially this distracting question, it will be only by giving due consideration to the opinions of our antagonists as well as to those on our own side. In this spirit of toleration and of compromise, we invite the attention of our readers to the perusal of both the able works before us. We proceed to give as copious extracts as our limits will permit, and in such manner as will do justice to the most material and opposing arguments of each. Considering this question only as it affects the agricultural interests of Virginia, we intentionally avoid the other branches of the discussion, which however important, are unsuitable for an agricultural review.

We will commence our extracts, by presenting Mr. Harrison's views of the evils of slavery as existing in Virginia:—

"Before beginning to unfold more fully our own views of the present exigency in Virginia, we take occasion to declare distinctly that our purpose is not by overcharged pictures of the iniquity of slavery, or the cruel lot of slaves, to raise a storm of gratuitous indignation in the minds of the people of the United States against Virginia. We believe that there is not the slightest moral turpitude in holding slaves under existing circumstances in the south. We *know* too that the ordinary condition of slaves in Virgina is *not* such as to make humanity weep for his lot. Our solicitations to the slaveholders, it will be perceived, are founded but little on *the miseries of the blacks*. We direct ourselves almost exclusively to the injuries slavery inflicts on the whites. And of these evils suffered by the whites, the evil consequences of practising the immorality of slaveholding will not be our mark. Reproach and recrimination on such a subject would answer no good purpose; it would naturally provoke defiance from the slaveholders. All the eloquent invectives of the British abolitionists have not made one convert in the West Indies. This is no part of our humor. It is *our* object to lure Virginia onward in her present hopeful state of mind. We mean to confine every word we write to Virginia. The whole scope of this article will be *to show the necessity of her promptly doing something to check the palpable mischiefs her prosperity is suffering from slavery*. We design to show that all her sources of *economical* prosperity are poisoned by slavery, and we shall hint at its moral evils only as they occasion or imply destruction to the real prosperity of a nation. Unless we first make this position impregnable, we shall ask no one to sacrifice merely to abstract humanity and justice. Nor shall we insist on Virginia's beginning action on his momentous subject, until we have shown that her genuine ultimate interest will be promoted by it. The best way of persuading men of this world to deeds which involve the sacrifice of present interests is to convince them that a greater prospective interest may be thereby secured. We shall strive then to procure the concurrence of self-interest as well as the approbation of humanity. Hence, even should we succeed in making out our case as to Virginia, it will be instantly remarked that we have said very little that will touch South Carolina and Georgia, and scarcely any thing

applicable to Louisiana, Mississippi and Alabama. If the prosperity of any of these is founded in circumstances of soil, climate, products, &c. of such nature and degree, as that it will not sink under the precarious specific (neck or nothing) of slave labor, *a la bonne heure* —let them go on. This is undoubtedly the case more or less of the sugar, cotton and rice plantation states. But it is not the case of Virginia. We propose to treat

"I. Of the injury slavery does to the prosperity of Virginia. Let us curiously indicate some of the evils which the experience of the United States shows to be consequent on slavery under ordinary circumstances, some of which Virginia has suffered in common with other states, of some of which she has been peculiarly the victim. 1. An inertness of most of the springs of prosperity—a want of what is commonly called public spirit. 2. Where slave labor prevails, it is scarcely practicable for free labor to co-exist with it to any great extent. Not that the latter would not deserve the preference, both for cheapness and efficiency, but that many obvious causes conspire to prevent the rivalship being preseveringly sustained. Freedom being itself regarded as a privelege in a nation that has slaves, there is a natural tendency to consider exemption from manual labor as the chief mark of elevation above the class of slaves. In a republic this tendency is vastly increased. A disposition to look on all manual labor as menial and degrading, may safely be set down as a distemper of the most disastrous kind. We shall not dilate on this. It must instantly be admitted that nothing can compensate a nation for the destruction of all the virtues which flow from mere industry. Virginia has experied this most signally; had her slave labor been ten times as productive as it has been, and grant that she possesses all the lofty qualities ever claimed for her in their highest degree, she would still have been the loser by contracting this ruinous disposition. Nothing but the most abject necessity would lead a white man to hire himself to work in the fields under the overseer, and we must say that we cannot refuse to sympathize with the free laborer who finds it irksome to perform hard work by the side of a slave. 3. Agriculture is the best basis of national wealth. 'Arts,' says that eminent farmer Mr. John Taylor of Caroline, 'improve the works of nature; when they injure it they are not arts but barbarious customs. It is the office of agriculture as an art not to impoverish, but to fertitize the soil and make it more useful than in its natural state. Such is the effect of every species of agriculture which can aspire to the name of an art.' Now it is a truth that an *improving* system of agriculture cannot be carried on by slaves. The negligent wasteful habits of slaves who are not interested in the estate, and the exacting cupidity of transient overseers who are interested in extorting from the earth the greatest amount of production, render all slave agriculture invariably exhausting. How many plantations worked by slaves are there in Virginia which are not perceptibly suffering the sure process of exhaustion? Perhaps not one, except a few on the water courses, composed of the alluvial soils which are virtually inexhaustible. The uncertainty of the profits of a crop generally deters the planters in Virginia from giving standing wages to their overseers—indeed, it has too often happened that the salary of the overseers has absorbed all the proceeds. Hence it is usual to give him, instead of salary, a share of the crop, The murderous effects of this on the fertility of the soil may well be conceived. An estate submitted to overseers entitled to a share of the crop (who are changed of course, almost yearly) suffers a thousand fold more than would English farms put out on leases of one or two years to fresh lessees. Twenty-one years is thought too short a term there. 4. It is a fact that no soil but the richest, and that in effect inexhaustible, can be profitably cultivated by slaves. In the legislature of Virginia it was repeatedly said that her lands were poor, and for that reason none but slaves could be brought to work them well. On the contrary, poor lands and those of moderate fertility can never repay the expense of slave labor, or bear up under the vices of that slovenly system. 5. In modern times, in most cases where slave labor prevails, it has been found in plantation states and colonies. There are many obvious reasons why, if profitable any where, it must only be there. Now, if this be the case, it would appear that slavery to be profitable is essentially incompatible with a dense population—at all events, with a relatively dense population of freemen. No country can afford to be given up exclusively to agriculture in the shape of plantation tillage, or to devote the entire attention of all the men it rears to that occupation, except its soil be extremely fertile and its products of the richest nature. Under other circumstances, the soil and products not making adequate returns, there is a vast waste of capabilities for other purposes, which the surface of many countries might answer. 6. It seems agreed among the economists of the south that slaves are unfit for the business of manufactures. A most sensible essay was published in Philadelphia in 1827 by Dr. Jones, afterwards superintendent of the patent office at Washington, to show that slaves are not necessarily unfit for this employment. We were persuaded at the time, that, if his position were true, it would prove the most important of all suggestions in an economical view, to Virginia. It has surprised us, indeed, that the advocates of the perpetuity of slavery in Virginia have not seen the immense advantage of such an argument to their side of the question. But the entire current of opinion in the south (led by an invincible sentiment of hostility to the protective system) is that states where slave labor prevails, and where the whole capital for labor is vested in slaves, cannot manufacture. It will need no words to show what an injury this voluntary disability inflicts on a country which may happen to have the most felicitous capacities for manufactures. 7. Where slave labor prevails, it would appear that the rearing a large class of skilful mechanics is greatly discouraged. The slaves themselves of course never make mechanics except of the coarsest description. Although the whites in the cities are not entirely averse to becoming artisans, yet in the country, the natural policy of the rich planters to have mechanics among their slaves to do all the needful business on their estates, deprives the white mechanics of their chief encouragement to perfect themselves in their trades, diminishes the demand for their services, and generally has the effect of expelling them from one neighborhood to another until they finally expatriate themselves. 8. Slave labor is, without controversy, dearer than free. It suffices to state, that in the one case you have a class of laborers that have a direct interest in doing and saving as little as possible, so that they barely escape punishment; in the other a class, every member of which has a direct interest in producing and saving as much as possible. But this position is too well established to justify any one in an argument to prove it. The categories wherein the contrary holds true are cumulatively: *a*. it must be in a plantation country; *b*. it must be in a soil extremely and inexhaustibly fertile; *c*. where the products are of the greatest value; *d*. and after all, it must be where white men cannot endure the climate and the nature of the cultivation. 9. The experience of the United States has shown that slavery decidedly discourages immigration (to use Dr. Southey's word) from foreign countries into the sections of country where it is prevalent. It is not a sufficient answer to this to say that the emigrants are in general allured to the United States by the temptation of the rich country in the west, so that slavery cannot be said to repel them from the southern states. It is not true of the best emigrants that come to our shores, that they are intent on pushing into the pathless forest, to be there banished from all the blessings of a settled country. This is in fact the positive passion of none but the hardy native pioneers, the Boones of Vermont, of New York, and Virginia. The Germans, for example, who are perhaps the most valuable of the

emigrants of America, are not people who would prefer to make their home in the midst of the extreme discomforts and often cruel privations which the pioneers undergo. Besides, what repels all those emigrants who are not agriculturists, and whose occupations lead them among crowds of men? Of immigration into the slaveholding states, except in some of the western states, where the principle of slavery is not yet predominant, it may be said there is none. The emigrants understand that their hope of employment there is forestalled, that the only labor wanted is indigenous to the soil; they feel that that labor is incompatible with their own, and they shrink from the idea of giving their children, who are to live by manual labor, a home in a slave-labor land, while fair regions, dedicated as well to domestic as to civil freedom, tempt their adventurous footsteps. With this evil may be classed the tendency of the whites of these states to emigrate from the soil of their birth. 10. Slavery begets inevitably a train of habits and opinions which, to say the least, are destructive of all those springs of prosperity which depend on economy, frugality, enterprise. Young people bred up to be maintained by slaves are apt to imbibe improvident habits. Of its favorable operation on the spirit of liberty in the whites, we are not disposed to question the well known opinion of Mr. Burke; the passage we refer to, is itself an evidence of the profound knowledge he possessed of the human heart. We consider it truer, however, of the spirit of liberty in its aspect of resistance to foreign oppression: in its home aspect it is, we think, comparatively just. But as relates to its operation in equalizing the whites with each other, we throw out the suggestion without note or comment, that *no property gives rise to greater inequalities than slave property*. We question, too, whether it could well be maintained that the *beau ideal* of a nabob—(we use the word in its fair, not invidious sense,)—endow him with nobleness of soul, sensibility, the utmost delicacy of honor, generosity, and hospitality—is the finest specimen of our species. There are many solid and essential virtues (wholly disconnected with those named) which could not so well be dispensed with as some of those, in going to make up the being of whom *par excellence* nature might stand up and say 'this is a man.'

"We can now venture to define pretty accurately what sort of a country that must be, which having regard solely to the economical principles, is adapted to be for a long term of years a prosperous slave-labor state. It must possess an extremely rich soil, hence under most circumstances be a comparatively small country, (otherwise the greater the difficulty of finding a uniformly fine soil, and consequently the impossibility of making the *whole* state flourish,) in a latitude the products of which, from their scarcity in the world, the permanent demand for them, and the possibility of rearing them in but few spots on the globe, are sure of a market at high prices, where the culture of such crops requires that the slaves be worked together in bodies, so that the constant supervision necessary over them may be performed by a few whites, and finally in a climate so nearly tropical, or otherwise precarious, as to make the exposure and toil insupportable to free (say *white*) laborers. A country uniting all these requisites may be prosperous with slave labor. It possesses certain sources of wealth, by the help of which it may dispense with many others, that are the necessary resource of countries of moderate fertility, and which are under different general circumstances. Such a country seems to need the moral-economical springs less. It will of necessity contain a sparse white population, but it may be formidable in war from its superior relative wealth. The countries growing cotton, rice, and the sugar cane, bountifully, are of this description. For aught we know, Brazil may fall under the definition. The principal West India islands appear to be entitled to expect prosperity, (supposing no adverse adventitious circumstances) but Louisiana unites all the requisites more perfectly perhaps than any other country. South Carolina and Georgia do it imperfectly, on account of their being so large a portion of both of them to which such description would not at all apply; Alabama and Mississippi do more perfectly than they. But it may boldly be said that *Virginia possesses scarcely a single requisite to make a prosperous slave-labor state.*

"*She has not the inexhaustible rich soils:* her earth orginally yielded fair returns to hard labor judiciously directed, but all such soils, as she has learned by bitter experience, are fated, under the hands of slaves, to deterioration down to utter barrenness. *She has too large a territory:* the curse of the presence of slaves and the monopoly of labor in their hands, is all over the state; the spots really adapted for profitable slave labor are few and scattered. *She has not the sort of products:* only a small part of the state produces cotton; the culture of tobacco, which was originally the general staple of Old Virginia proper, after destroying immense tracts of good lands, is shrinking into a very diminished compass, and scarcely repays the cost of production under the average prices of the last fifteen years. If any one would cast his eye over the list of the tobacco inspections established by law, in the revised code of Virginia, he would smile to see places mentioned for inspection warehouses, in quarters of Virginia where no man has ever seen a hundred weight of tobacco. Besides this, there is an unlimited competition springing up around her, to reduce prices to nothing. With regard to the crops of tobacco of the western states, we can say with confidence that there is a regular annual increase in quantity, with great improvement in its curing and management; so that it is fast taking the place of Virginia tobacco for consumption in the *leaf* in the north of Europe, and as *strips* in Great Britain. The article of tobacco is now cultivated in Ohio, Kentucky, Illinois, Indiana, Missouri, Tennessee, and in Canada, as well as Maryland, Virginia, the Carolinas and Georgia. The quantity raised is altogether too great for consumption. The other products of Virginia are the ordinary growth of all temperate, and most northern regions. *She has not the climate which would put slaves on the vantage ground above whites:* every part of her territory is adapted to the men of all climates, and she has not a foot of soil which nature declares that none but blacks shall cultivate, nor a product the cultivation of which demands lives and labors baser than those of white men. Tobacco is notoriously cultivated with success by whites in any part of the world which is temperate enough to grow it. It is then a total miscalculation in every point of view—a false position for Virginia to have allotted to herself the exclusite labor of slaves.

"But appeal is made to the history of the economy of Virginia to contradict this assertion. Is it demanded, for instance, why Virginia should prosper before the revolution as she did, with her slave labor, if there be a fatal error in her adoption of slavery? We may answer, that there is no great mystery in that. Virginia while a colony never did furnish the miracles of great and sudden fortunes which the West India and South Carolina nabobs used to exhibit in England. Adam Smith in his day made this remark. At that time fine tobacco was an article only grown in Virginia and Maryland, and the prices were relatively to the times very high; whereas now and for all future time, a competition wholly beyond the conception of that day has completely revolutionized the market. But admit that the colony was very prosperous: if from this it is meant to argue that Virginia may again be so under the same system, we hope it will not at least be denied that the revolution found almost all the lands which had been opened nearly or quite exhausted, showing plainly that the preceding hundred years had been passed in fits of profitable planting from the frequent resort to successive new lands. Mr. Taylor of Caroline had understood that 60,000 hogsheads of tobacco were exported from Virginia, when the whole population did not exceed 150,000. Had the fertility of the country by possibility remained undiminished, (as he says it would if

her slave agriculture had been any thing else than 'a barbarous custom,' not an art,) Virginia ought in 1810, to have exported 240,000 hogsheads, or their equivalent in other produce,and at present nearly the double of that. Thus the agricultural exports of Virginia in 1810 would, at the estimate prices of the Custom House at that time, have been seventeen millions of dollars, and now at least thirty-four, while it is known that they are not of late years greater than from three to five millions.—This will at once show that the great crops of the colonial times were forced, or we may say *exaggerated* by the possession of means, which will never again be in her hands.

"The fact that the whole agricultural products of the state at present, do not exceed in value the exports eighty or ninety years ago, when it contained not a sixth of the population, and when not a third of the surface of the state (at present Virginia) was at all occupied, is however a very striking proof of the decline of its agriculture. What is now the productive value of an estate of land and negroes in Virginia? We state as the result of extensive inquiry embracing the last fifteen years, that a very great proportion of the larger plantations, with from fifty to one hundred slaves, actually bring their proprietors in debt at the end of a short term of years, notwithstanding what would once in Virginia have been deemed very sheer economy; that much the larger part of the considerable landholders are content, if they barely meet their plantation expenses without a loss of capital; and that, of those who make any profit, it will in none but rare instances average more than one to one and a half per cent. on the capital invested. The case is not materially varied with the smaller proprietors. Mr. Randolph of Roanoke, whose sayings have so generally the raciness and the truth of proverbs, has repeatedly said in Congress, that the time was coming when the masters would run away from the slaves and be advertised by them in the public papers. A decided improvement in the Virginia system is taking place in some parts of the state, which consists in the abandonment of the culture of tobacco for that of wheat, Indian corn, &c. which can be produced on soil too poor for tobacco, requires fewer laborers, and will not be so apt to reduce the fertility of the soil still lower. This is a judicious thing in itself, but here again recurs the truth we have already set forth: plantations with such products as these never can be profitably managed with slave labor. Wheat and corn will not do for this; let the planter turn his sons in to work his lands, and then these products will suffice.—Tobacco was the only article which ever could by possibility justify the expense of slave labor in Virginia; and now we see that the wiser planters are to a great degree withdrawing their lands from it.

"There is however one way in which capital invested in slaves may be said to be productive. We will now let the reader into a secret of slave-holding economy.—The only form in which it can safely be said that slaves on a plantation are profitable in Virginia, is in the multiplication of their number by births. If the proprietor, beginning with a certain number of negroes, can but keep them for a few years from the hands of the sheriff or the slave trader, though their labor may have yielded him not a farthing of net revenue, he finds that gradually but surely, his capital stock of negroes multiplies itself, and yields, if nothing else, a palpable interest of young negroes. While very young they occasion small expense, but they render none or small service; when grown up, their labor, as we have already seen, hardly does more than balance the expense they occasion. The process of multiplication will not in this way advance the master towards the point of a net revenue; he is not the richer in income with the fifty slaves than with twenty. Yet these young negroes have their value: and what value! The value of the slaves so added to his number is the certain price for which they will at any time sell to the southern trader. Should the humanity of the proprietor, however, and his rare forrune of keeping out of debt, prevail on him never to treat his slaves as live stock for traffic, he finds himself incumbered with the same unproductive burden as before. That master alone finds productive value in his increase of slaves, who chooses to turn the increase of his capital, at regular intervals, into money at the highest market price! There are, we make haste to say, very many masters with whom it is a fixed rule never to sell a slave, except for incorrigibly bad character, so long as the pressure of necessity does not compel it. There are some who would feel it to be the wanton breach of a tie next in sanctity to the most sacred of the domestic relations. But such sensibility cannot be supposed to be universal. Accordingly, the state does not derive a tangible profit from its slaves: this is true to the heart's content of the adversaries of abolition, and that by means of yearly sales to the negro traders. An account, on which we may rely, sets down the annual number of slaves sold to go out of the state at six thousand, or more than half the number of births! The population returns show only a yearly addition of four thousand eight hundred to the slaves remaining in the state. If all these sales were the result of the necessities of the masters, while it must for ever be lamented, it would at the same time be the most portentous proof of the financial ruin of the planters of the state. But if otherwise, if but a common course of business regularly gone into for profit, what volumes does it speak of the degradation to which slavery may reduce its supporters! And will 'the aspiring blood of Lancaster' endure it to be said that a Guinea is still to be found in America, and that Guinea is Virginia?—That children are reared with the express object of sale into distant regions, and that in numbers but little less than the whole number of annual births? * *

* * Shall the profits to Virginia, from this contaminated source, be alleged as an economical argument to magnify the sacrifice involved in the abolition of slavery, and this too by statesmen who profess to execrate the African slave trade? For ourselves, we can see but little difference between this form of the internal slave trade and the African trade itself. But we have too deep a stake ourselves in the good name of the land of Washington and Jefferson, to be willing to admit that this form of profit from slaves is cherished by any but a very few persons. This is not then an income which Virginia loves to reap. She scorns those who resort to it, and will count lightly of the sacrifice which the extinction of this fountain of impure wealth would involve.

"Banishing this then out of view, there is no productive value of slaves in Virginia. Shut up all outlet into the southern and southwestern states, and the price of slaves in Virginia would sink down to a cypher.—Without the possibility of deriving from slave labor any of the benefits, by which in some countries it seems to compensate (whether adequately or not) for its pernicious moral effects, Virginia is cursed with an institution unproductive of good to her, and potent in mischiefs beyond all her fears. If ever there was a specific, which failing of its possible good effects, would induce irremediable pains, it is slavery. We check the struggling inclination to paint the woes Virginia has suffered from its miscarriage, in their true colors, but the truth would seem exaggeration. Take then the following temperate detail from the speech of Mr. Marshall, every word of which is true by the experience of Virginia:

"'Wherefore, then, object to slavery? Because it is ruinous to the whites—retards improvement—roots out an industrious population—banishes the yeomanry of the country—deprives the spinner, the weaver, the smith, the shoemaker, the carpenter, of employment and support. This evil admits of no remedy; it is increasing and will continue to increase, until the whole country will be inundated with one black wave covering its whole extent, with a few white faces here and there floating on the surface. The master has no capital but what is vested in [slaves;] the father, instead of being

richer for his sons, is at a loss to provide for them—there is no diversity of occupations, no incentive to enterprise. Labor of every species is disreputable because performed mostly by slaves. Our towns are stationary, our villages almost every where declining, and the general aspect of the country marks the curse of a wasteful, idle, reckless population, who have no interest in the soil, and care not how much it is impoverished. Public improvement are neglected, and the entire continent does not present a region for which nature has done so much, and art so little. If cultivated by free labor, the soil of Virginia is capable of sustaining a dense population, among whom labor would be honorable, and where "the busy hum of men" would tell that all were happy, and that all were free.'

"Virginia has suffered, and is now suffering under all the ten specifications just given, and in a greater degree than any other of the slaveholding states could.—Her statesmen and engineers mourn over her inertness of spirit for public improvements; her economists mourn over the little inclination of her citizens to labor of any kind; her agriculturists upbraid her for letting the soil sink into irrecoverable exhaustion, that she is burdened with the dearest sort of labor, and persists in applying to a country of originally moderate fertility, a system absolutely ruinous to any but the richest alluvial soils; that industry and frugality are banished; that she renders it virtually impossible to open a new source of wealth in manufactures, and that while the principle of population is almost stagnant among her whites, and her own sons are departing from her, she repulses by her domestic relations all the emigrants to America from the old world who might else come in to repair her ruin. It is ridiculous to talk of the prosperity of a country wholly agricultural, with slave labor and exhausted lands. The proud homes of Virginia, from the revolution down to this day have been passing from the hands of their high-minded proprietors, to the humble overseers that used to *sit below the salt* at their board, and from them in their turn to some other newer *parvenus*: agriculture has failed to enrich. Of the white emigrants from Virginia, at least half are hard working men, who carry away with them little besides their tools and a stout heart of hope: the mechanic trades have failed to give them bread. Commerce she has little, shipping none and it is a fact that the very staple of the state, tobacco, is not exported by her own capital—the state does virtually a commission business in it. All the sources of prosperity, moral and economical, are deadened; there is a general discontent with one's lot; in some of the first settled and choicest parts of her territory, symptoms are not wanting of desolate antiquity. And all this in youthful America, and in Virginia too, the fairest region of America, and with a race of people inferior to none in the world in its capacity to constitute a prosperous nation.

"There are some facts disclosed by the population returns for 1830, which we are not aware have been fully brought to the public notice. Every one is now acquainted with the uncomfortable truth, that the whites east of the Blue Ridge had in 1790 a majority of 25,000, and that in the course of forty years they have not only lost it, but suffered the blacks to get an ascendency in number to the extent of 81,000: thus the advance of the blacks is 106,000 in that half of the state in that period. But we may see by the subjoined table that there are not a few counties of middle as well as lower Virginia (component parts of eastern Virginia) which have actually diminished in white population in the last ten years! The first five are counties between the Blue Ridge and the head of tide-water; the others below the head of tide-water.

	Whites in 1820.	1830.
Brunswick,	5889	5397
Amelia,	3409	3293
Goochland	3976	3857
Loudoun,	16144	15516
Mecklenburg,	7710	7543
Fairfax,	6224	4892
James City,	1556	1284
King and Queen,	5460	4714
King William	3449	3155
Lancaster,	2388	1976
Northumberland,	4134	4029
Sussex,	4155	4118
Stafford,	4788	4713
Warwick,	620	619

These counties at an average annual increase of three per cent. (which is sufficiently moderate) would have added more than 20,000 to their aggregate numbers; they have sustained a loss of near 5000 in ten years, which is fully one twelfth of their capital in 1820—Conjecturally the people in these counties are as prolific as elsewhere; emigration, the result of the characteristic ills of Virginia, has done most to occasion this loss. All of these are fine counties."

We next proceed to the means proposed by Mr. Harrison, for removing slavery from Virginia.

"We believe that means may be found to colonize the annual surplus of the slaves of Virginia, and to purchase such a portion of that surplus as it may be necessary to purchase.

"The annual increase of slaves in Virginia (leaving out of view the 6000 supposed to be taken off to the southern markets) is less than 5000. If this number of slaves be valued at the average of $200 per head, the sum necessary to purchase them will be about a million of dollars. To defray the expense of their deportation to Africa and subsistence there for some months will, on the satisfactory calculation of Mr. Mathew Carey, to which we must refer, at $25 per head for adults and children, require $125,000—add to which the cost of deportation of 1200 free blacks (their annual increase,) $30,000, and we have the sum of $150,000. That the state of Virginia has no possible means of purchasing 5000 slaves *per annum* is obvious. But were the entire cost that of transportation only, $150,000, we should insist that the Legislature take it into serious consideration how far that expense exceeds its means. In any event, our adversaries will allow us to set down the item of transportation to the charge of the state: if this be all, it is to offer no insurmountable embarrassment. Perhaps it may be thought best to deport the free negroes first, and then the whole expense is that of transportation. Where, however, shall we find that greater fund which will presently be needed for the purchase of the surplus of the slaves, and before long for the purchase of ¼ part of the capital number? There is not far off a fund to which we believe our eyes may be turned. We have come to the conclusion that such a fund is the proceeds of the public lands in the treasury of the general government; and we do now invite the friends of the removal and colonization of the negroes to fix hereafter their thoughts and to press their pretensions on this fund. The annual income to government from the public lands is now estimated at three millions. Let one-third of this amount be demanded for this object, *to be under the entire management of the state authorities.*

"In coincidence with the known opinion of Virginia, we are not willing to demand a simple appropriation of money from Congress. But we are inclined to think, that an appropriation from the receipts of the public lands would not be liable to the constitutional objection, which would forbid a grant of money raised by taxes. We have an unfeigned respect for constitutional scruples, but we are not ambitious ourselves of entertaining more scruples than Mr. Madison. Let us hear then what that greatest living authority says upon the subject, in his letter to Mr. Gurley, of December last:—

"'In contemplating the pecuniary resources needed for the removal of such a number to a great distance, my thoughts and hopes have been long turned to the

rich fund presented in the western lands of the nation, which will soon entirely cease to be under a pledge for another object. The great one in question is truly of a national character, and it is known that distinguished patriots not dwelling in slave-holding states have viewed the object in that light, and would be willing to let the national domain be a resource in effecting it. Should it be remarked that the states, though all may be interested in relieving our country from the colored population, are not equally so; it is but fair to recollect, that the sections most to be benefited are those whose cessions created the fund to be disposed of. I am aware of the constitutional obstacle which has presented itself; but if the general will should be reconciled to an application of the territorial fund to the removal of the colored population, a grant to congress of the necessary authority could be carried, with little delay through the forms of the constitution.'

"Before any one condemns us for looseness of construction of the constitution, we beg further that he will read Mr. Jefferson's letter to Mr. Sparks, (vol. iv., pp. 388, 391;) we adopt all the qualifications therein mentioned.

"Judge Marshall most properly suggests that the objection, in a political view, to the application of this ample fund, is very much lessened, in his estimation, by the fact that our lands are becoming an object for which the states are to scramble, and which threatens to sow the seeds of discord among us, instead of being what they might be—a source of national wealth.

"A great part of the proceeds of the public domain once appropriated to this object, there would soon be found no insurmountable difficulty in the removal of the necessary number in Virginia. But it is said that were congress disposed to give a million annually for the specific object of the removal of the slaves, it would feel bound to bestow it proportionally on all the slave-holding states, or if all be not inclined to receive it, then on those which would be. We answer, that, if congress should consent to pledge a certain share of the revenue from the lands for the purchase and removal (under the laws of the states) of the slaves of the United States, we have no doubt it would be thought wise to begin with the effectual relief of the greatest sufferer first. A minute attention to the following statement of General Brodnax, will show the immense claims of Virginia.

" 'The state of Virginia contains, by the last census, less than one-fifteenth part of the whole *white* population of the United States; it contains more than one-seventh of the free negroes; and it possesses between a fourth and a fifth of all the slaves in the union.

" 'Virginia has a greater number of slaves than any other state in the union—and more than Louisiana, Mississippi, Alabama and Tennessee, all put together; and more than four times as many as either of them. Louisiana and South Carolina are the only states in which the slaves are more numerous than the white population; and Virginia has more slaves, without estimating her great and unfortunate proportion of free persons of color, than both these states put together. Nay, one-half of the state, that which lies on the east of the Blue Ridge of mountains, itself contains nearly as many.'

"But if congress should decline to grant from this fund for the specific purpose of the removal of the blacks, and prefer to distribute among the states the portion of money severally assignable to them, let such portion as would fall to Virginia be earnestly claimed of the legislature for this object. The annual receipt of between two and three hundred thousand dollars, which Mr. Clay's bill (limited to five years' duration) would assign to her, would not be adequate for compensating masters on the foregoing plan, but it might suffice for doing an immense deal of good on the plan of Mr. Jefferson's letter to Mr. Sparks, the *purchase of the children* at a small but just price, the children to be disposed of either according to the particulars of that plan, or under any other plan which might be speedier, and less burdensome to the persons to be charged with rearing them.

" We believe that before half a million of blacks were conveyed to Africa, there would not remain a master obstinately resolved to retain his slave except in the most southern and south-western states, where slave labor is next to essential (we hope not absolutely) for the cultivation of the good lands!

" We exhort the people of Virginia then, first to seek aid from their own Legislature to the extent it can be afforded; second, to insist on the passage of permanent laws going as far in the subject as public opinions will justify; and third, to assert their claims to a share of the proceeds of the public lands. Let it not, by her fastidiousness, be made true, that she ceded an empire to the general government, under a virtual condition that she alone was to derive no benefit from it.

" Suppose then means to be thus found to defray the expense of emancipating and transporting them to some other country, the next question is, where a suitable asylum may be found to which to convey them? We answer, that Africa affords the most eligible situation for such an asylum, and that we hope Virginia would avail herself of the noble beginning which has been made by the American Colonization Society at Liberia."

From Mr. Dew's work, our extracts will be limited to his remark on the plans for the abolition of negro slavery.

"Under this head we will examine, first, those schemes which propose abolition and deportation, and secondly, those which contemplate emancipation without deportation.

" 1. *Emancipation and Deportation.*—In the late Virginia Legislature, where the subject of slavery underwent the most thorough discussion, all seemed to be perfectly agreed in the necessity of removal in case of emancipation. Several members from the lower counties, which are deeply interested in this question, seemed to be sanguine in their anticipations of the final success of some project of emancipation and deportation to Africa, the original home of the negro. 'Let us translate them,' said one of the most respected and able members of the legislature (General Brodnax,) 'to those realms from which, in evil times, under inauspicious influence, their fathers were unfortunately abducted. Mr. Speaker, the idea of restoring these people to the region in which nature had planted them, and to whose climate she had fitted their constitutions—the idea of benefiting not only our condition and their condition by the removal, but making them the means of carrying back to a great continent, lost in the profoundest depths of savage barbarity, unconscious of the existence even of the God who created them, not only the arts and comforts and multiplied advantages of civilized life, but what is of more value than all, a knowledge of true religion--intelligence of a Redeemer—is one of the grandest and noblest, one of the most expansive and glorious ideas which ever entered into the imagination of man. The conception, whether to the philosopher, the statesman, the philanthropist, or the Christian, of rearing up a colony which is to be the nucleus around which future emigration will concentre, and open all Africa to civilization and commerce, and science and arts and religion—when Ethiopia shall stretch out her hands, indeed, is one which warms the heart with delight.' (*Speech of Gen. Brodnax of Dinwiddie*, pp. 36 and 37.) We fear that this splendid vision, the creation of a brilliant imagination, influenced by the pure feelings of a philanthropic and generous heart, is destined to vanish at the severe touch of analysis. Fortunately for reason and common sense, all these projects of deportation may be subjected to the most rigid and accurate calculations, which are amply sufficient to dispel all doubt, even in the minds of the most sanguine, as to their practicability.

We take it for granted that the right of the owner to

his slave is to be respected, and consequently that he is not required to emancipate him, unless his full value is paid by the state. Let us then, keeping this in view, proceed to the very simple calculation of the expense of emancipation and deportation in Virginia. The slaves, by the last census (1830) amounted within a small fraction to 470,000; the average value of each one of these is $200; consequently the whole aggregate value of the slave population of Virginia in 1830, was $94,000,000, and allowing for the increase since, we cannot err far in putting the present value at $100,000,000. The assessed value of all the houses and lands in the state amounts to $206,000,000, and these constitute the material items in the wealth of the state, the whole personal property besides bearing but a very small proportion to the value of slaves, lands, and houses. Now, do not these very simple statistics speak volumes upon this subject? It is gravely recommended to the state of Virginia to give up a species of property which constitutes nearly one-third of the wealth of the whole state, and almost on-half of that of Lower Virginia, and with the remaining two-thirds to encounter the additional enormous expense of transportation and colonization on the coast of Africa. But the loss of $100,000,000 of property is scarcely the half of what Virginia would lose, if the immutable laws of nature could suffer (as fortunately they cannot) this tremendous scheme of colonization to be carried into full effect. Is it not population which makes our lands and houses valuable? Why are lots in Paris and London worth more than the silver dollars which it might take to cover them? Why are lands of equal fertility in England and France worth more than those of our Northern States, and those again worth more than Southern soils, and those in turn worth more than the soils of the distant West? It is the presence or absence of population which alone can explain the fact. It is in truth the slave labor in Virginia which gives value to her soil and her habitations—take away this and you pull down the Atlas that upholds the whole system—eject from the state the whole slave population, and we risk nothing in the prediction, that on the day in which it shall be accomplished, the worn soils of Virginia will not bear the paltry price of the government lands in the west, and the Old Dominion will be a 'waste howling wilderness,'—'the grass shall be seen growing in the streets, and the foxes peeping from their holes.'

"But the favorers of this scheme say they do not contend for the sudden emancipation and deportation of the whole black population;—they would send off only the increase, and thereby keep down the population to its present amount, while the whites increasing at their usual rate, would finally become relatively so numerous as to render the presence of the blacks among us for ever afterwards entirely harmless. This scheme, which at first to the unreflecting seems plausible, and much less wild than the project of sending off the whole, is nevertheless impracticable and visionary, as we think a few remarks will prove. It is computed that the annual increase of the slaves and free colored population of Virginia, is about six thousand. Let us first, then, make a calculation of the expense of purchase and transportation. At $200 each, the six thousand will amount in value to $1,200,000. At $30 each, for transportation, which we shall soon see is two little, we have the whole expense of purchase and transportation $1,380,000, an expense to be annually incurred by Virginia to keep down her black population to its present amount. And let us ask, is there any one who can seriously argue that Virginia can incur such an annual expense as this for the next 25 or 50 years, until the whites have multiplied so greatly upon the blacks, as in the *opinion* of the *alarmists* for ever to quiet the fears of the community? Vain and delusive hope, if any were ever wild enough to entertain in! Poor old Virginia, the leader of the *poverty stricken team*, which have been for years so heavily dragging along under the intolerable burthen of the Federal Government, must inevitably be crushed whenever this new weight is imposed on her, in comparison with which federal exactions are light and mild. We should as soon expect the *chamois*, the hardy rover over Alpine regions, by his unassisted strength, to hurl down the snowy mantle which for ages has clothed the lofty summit of Mont Blanc, as that Virginia will be ever able by her own resources to purchase and colonize on the coast of Africa six thousand slaves for any number of years in succession.

"But this does not develope to its full extent the monstrous absurdity of this scheme. There is a view of it yet to be taken, which seems not to have struck very forcibly any of the speakers in the Virginia legislature, but which appears to us of itself perfectly conclusive against this whole project. We have made some efforts to obtain something like an accurate account of the number of negroes every year carried out of Virginia to the south and south-west. We have not been enabled to succeed completely; but from all the information we can obtain, we have no hesitation in saying, that upwards of 6000 are yearly exported to other states. Virginia is in fact a *negro* raising state for other states; she produces enough for her own supply, and 6000 for sale. Now, suppose the government of Virginia enters the slave market, resolved to purchase 6000 for emancipation and deportation, is it not evident that it must overbid the southern seeker, and thus take the very slaves who would have gone to the south? The very first operation then of this scheme, provided slaves be treated as property, is to arrest the current which has been hitherto flowing to the south, and to accumulate the evil in the state. As sure as the moon in her transit over the meridian arrests the current which is gliding to the ocean, so sure will the action of the Virginia government, in an attempt to emancipate and send off 6000 slaves, stop those who are annually going out of the state; and when 6000 are sent off in any one year, (which we never expect to see,) it will be found on investigation that they are those who would have been sent out of the state by the operation of our slave trade, and to the utter astonishment and confusion of our abolitionists, the black population will be found advancing with its usual rapidity—the only operation of the scheme being to substitute our government, *alias ourselves*, as purchasers, instead of the planters of the south. This is a view which every legislator in the state should take. He should beware lest in his zeal for action, this efflux, which is now so salutary to the state, and such an abundant source of wealth, be suddenly dried up, and all the evils of slavery be increased instead of diminished. If government really could enter with capital and zeal enough into the boundless project, we might even in a few years, see the laws of our nature reversed, and the tide of slavery flowing from the south in Virginia, to satisfy the philanthropic demand for colonization. The only means which the government could use to prevent the above described effect, would be either arbitrarily to fix the price of slaves below their market value, which would be a clear violation of the right of property, (which we shall presently notice,) or to excite a feeling of insecurity and apprehension as to this kind of property, and thus dispose the owner to part with it at less than its true value: but surely no statesman would openly avow such an object, although it must be confessed that some of the speakers even who contended that slaves should ever be treated as property, avowed sentiments which were calculated to produce such a result.

"It is said, however, that the southern market will at all events be closed against us, and consequently that the preceding argument falls to the ground. To this we answer, that as long as the demand to the south exists, the supply will be furnished in some way or other, if our government do not unwisely tamper with the subject. Bryan Edwards has said, that 'an attempt to prevent the introduction of slaves into the West Indies would be like changing the winds, or giving laws to the

ocean.' We may with truth affirm, that an attempt to prevent a circulation of this kind of property through the slave-holding states of our confederacy, would be equally if not more impracticable. But there is a most striking illustration of this now exhibiting before our eyes—the Southampton massacre produced great excitement and apprehension throughout the slave-holding states, and two of them, hitherto the largest purchasers of Virginia slaves, have interdicted their introduction under severe penalties. Many in our state looked forward to an immediate fall in the price of slaves from this cause—and what has been the result? Why, wonderful to relate, Virginia slaves are now higher than they have been for many years past—and this rise in price has no doubt been occasioned by the number of southern purchasers who have visited our state, under the belief that Virginians had been frightened into a determination to get clear of their slaves at all events; 'and from an artificial demand in the slave purchasing states caused by an apprehension on the part of the farmers in those states, that the regular supply of slaves would speedily be discontinued by the operation of their non-importation regulations;'* and we are, consequently, at this moment exporting slaves more rapidly, through the operation of the internal slave trade, than for many years past.

"Let us now examine a moment into the object proposed to be accomplished by this scheme. It is contended that free labor is infinitely superior to slave labor in every point of view, and therefore that it is highly desirable to exchange the latter for the former, and that this will be gradually accomplished by emancipation and deportation; because the vacuum occasioned by the exportation of the slaves will be filled up by the influx of freemen from the north and other portions of the union; and thus, for every slave we lose, it is contended we shall receive in exchange a free laborer, much more productive and more moral. If we are not greatly mistaken this, on analysis, will be found to be a complete specimen of that arithmetical *school boy* reasoning, which has ever proved so deceptive in politics, and so ruinous in its practical consequences; and first, let us see whether any thing will be gained in point of productiveness, by this exchange of slave labor for free, even upon the avowed principles of the abolitionists themselves. The great objections to slave labor, seem to be—First, that it is unproductive, or at least, not as productive as free labor; and secondly, that it is calculated to repel free labor from the sphere in which it is exercised. This latter effect has been briefly and more ingeniously urged by a writer in the Richmond Enquirer of the 3d of March 1832, over the signature of 'York,' than by any one who is known to us, and we shall consequently introduce an extract from his essay.

" 'Society naturally resolves itself,' says this writer 'into three classes. The first comprehends professional men, capitalists and large landed proprietors; the second, embraces artizans and small proprietors; and the third, is composed of common laborers. Now we are a society placed in the anomalous predicament of being *totally without a laboring class*; for all our labor is performed by slaves, who constitute no part of that society, and who *quo ad* that society, may be regarded as brutes or machines. This circumstance operates directly as a check upon the increase of white population. For, as some intelligence or property is required to enable a man to belong to either of the two first classes above enumerated, (and which I have remarked are the only classes which we have,) and as no one with ordinary self-respect, can submit to sink below them, and become outcasts, the immediate tendency of the supernumerary members is to emigration.' We will not for the present, dispute the premises of the very intelligent and graceful writer, from whom we have copied the above extract; we have endeavored throughout this review, to show that our adversaries are not justified in their conclusions, even if we admit the truth of their premises. Now, what is the conclusion arrived at by our adversaries, from the premises just mentioned? That we must deport our slaves as fast as possible, and leave the vacuum to be filled by free labor. In the first place, then, we say upon their *own* principles even, they cannot expect free labor to take the place of slave, for every one acknowledges it utterly impossible to send away, at once, all our slaves—there is scarcely we presume, a single abolitionist in Virginia, who has ever supposed, that we can send away more than the annual increase. Now, then, we ask, how can any one reasonably expect that the taking away of two or three negroes from a body of one hundred, (and this is a much greater proportion than the abolitionists hope to colonize,) can destroy that prejudice against laboring with the blacks, which is represented as preventing the whites from laboring, and as sending them in multitudes to the west. If we are too proud to work in a field with fifty negro men this year, we shall surely be no more disposed to do it next year, because one negro, the increase of the fifty, has been sent to Liberia; and consequently the above reasoning, if it prove any thing, proves that we must prevent our laboring classes (the blacks) from increasing, because whites will not work with them—although the whites will be just as averse to working with them after you have checked their increase as before!

" But let us suppose, that by some kind of logical *legerdemain*, it can be proven that free labor will supply the place of slave labor, which is deported to Africa—even then, we think they will fail upon their other great principle, that free labor is better than slave, the truth of which principle for the present, we are willing to allow—and their whole argument fails, for this plain and palpable reason, that free labor by association with slave labor, must inevitably be brought down to its level and even below it,—for the vices of the slave you may correct, by means of your authority over him, but those of the associate free laborer you cannot. Every farmer in Virginia, can testify to the truth of this assertion. He knows full well, that if he employs a white laborer to work with a black one, even at *job work*, where of course the inducement to labor is greatest—he will not do more than the negro, and perhaps in a majority of cases, he will not do as much. What then might we expect of him, if he should enter the field with fifty fold his number of blacks, to work along with them regularly through the four seasons of the year? We hazard little in saying, he would be a more unproductive laborer than the black, for he would soon have all his idle propensities, without being subjected to the same salutary restraint.

"It is a well known general fact, to all close observers of mankind, that if two different grades of labor as to productiveness be associated together in the same occupation, the higher has a tendency to descend to the level of the lower. Schmalz, in his Political Economy, says that the indolence and carelessness of the serfs in the north of Europe, corrupt the free laborers who come into *contact* with them. Jones, in his volume on Rents, says, 'a new road is at this time (1831) making, which is to connect Hamburg and the Elbe with Berlin; it passes over the sterile sands, of which so much of the north of Germany consists, and the materials for it are supplied by those isolated blocks of granite, of which the presence on the surface of those sands forms a notorious geological puzzle. These blocks, transported to the line of road, are broken to the proper size by workmen, some of whom are Prussian free laborers, others Leibeigeners of the Mecklenburg territory, through a part of which the road passes. They are paid a stipulated sum

* From Louisiana many of the farmers themselves have come into our state, for the purpose of purchasing their own slaves, and thereby evading the laws. There are in fact, so many plans which will effectually defeat all these preventive regulations, that we may consider their rigid enforcement utterly impracticable; and moreover, as the excitement produced by the late insurrection in Virginia dies away, so will these laws be forgotten, and remain as dead letters upon the statute books.

for breaking *a certain* quantity, *and all are paid alike.*—Yet the Leibeigeners could not at first be prevailed upon to break more than one-third of the quantity which formed the ordinary task of the Prussians. The men were *mixed*, in the hope that the example and the gains of the more industrious, would animate the sluggish.—Now mark the result. A contrary effect followed; the Leibeigeners *did not improve*, but the exertions of the other laborers *sensibly slackened*, and at the time my informant (the English engineer who superintended the work,) was speaking to me, the men were again at work in *separate* gangs carefully kept asunder."* And thus do we find, by an investigation of this subject, that if we should introduce, by any means, free labor in the stead of slave labor deported to Africa, that it will be certain to deteriorate by association with slave labor, until it sinks down to and even below its level. So far we have admitted the possibility of exchanging slave for free labor, and have endeavored to prove, upon the principles of the abolitionists, that nothing would be gained by it. We will now endeavor to prove, and we think we can do it incontestably, that the scheme of abolition and deportation will not and cannot possibly effect this exchange of slave labor for free, even if it were desirable. And in order that we may examine the project fully in this point of view, we will endeavor—first, to trace out its operation on the slave population, and then on the white.

"Since the publication of the celebrated work of Doctor Malthus on the 'Principle of Population,' the knowledge of the causes which affect its condition and increase, is much more widely diffused. It is now well known to every student of political economy, that in the wide range of legislation there is nothing more dangerous than too much tampering with the elastic and powerful *spring* of population.

"The energies of government are for the most part feeble or impotent when arrayed against its action.—It is this procreative power of the human species, either exerted or dormant, which so frequently brushes away *in reality* the visionary fabrics of the philanthropists, and mars the cherished plots and schemes of statesmen. Euler has endeavored to prove, by some calculations, that the human species, under the most favorable cirstances, is capable of doubling itself once in twelve years. In our western country, the progress of population has, in many extensive districts, been so rapid as to show, in our opinion, most conclusively, that it is capable of doubling itself once in fifteen years without the aid of emigration. The whole of our population, since the independence of the United States, has shown itself fully capable of duplication in periods of twenty-five years, without the accession from abroad.† In some portions of our country, the population is stationary, in others but very slowly advancing. We will assume then for the two extremes in our country, the stationary condition on the one side, and such increase on the other as to give rise to a duplication every fifteen years.—Now as throughout the whole range comprehended between these extremes, population is capable of exerting various degrees of energy, it is very evident that the statesman who wishes to increase or diminish population, must look cautiously to the effect of his measures on its spring, and see how this will be acted on. If, for example, his object be to lessen the number of a slowly increasing population, he must be convinced that his plan does not stimulate the procreative energies of society to produce more than he is capable of taking away; or if his object be to increase the numbers, take heed lest this project deaden and paralyze the source of increase so much as to more than counterbalance any effort of his. Now looking at the texture of the Virginia population, the desideratum is to diminish the blacks and increase the whites. Let us see how the scheme of emancipation and deportation will act. We have already shown that the first operation of the plan, if slave property were rigidly respected and never taken without full compensation, would be to put a stop to the efflux from the state through other channels; but this would not be the only effect. Government entering into the market with individuals, would elevate the price of slaves beyond their natural value, and consequently the raising of them would become an object of primary importance throughout the whole state. We can readily imagine that the price of slaves might become so great that each master would do all in his power to encourage marriage among them—would allow the females almost entire exemption from labor, that they might the better breed and nurse—and would so completely concentrate his efforts upon this object, as to neglect other schemes and less productive sources of wealth. Under these circumstances the prolific African might no doubt be stimulated to press hard upon one of the limits above stated, doubling his numbers in fifteen years; and such is the tendency which our abolition schemes, if ever seriously engaged in, will most undoubtedly produce; they will be certain to stimulate the procreative powers of that very race which they are aiming to diminish; they will enlarge and invigorate the very monster which they are endeavoring to stifle, and realize the beautiful but melancholy fable of Sisyphus, by an eternal renovation of hope and disappointment. If it were possible for Virginia to purchase and send off annually for the next twenty-five or fifty years, 12,000 slaves, we should have very little hesitation in affirming, that the number of slaves in Virginia would not be at all lessened by the operation, and at the conclusion of the period such habits would be generated among our blacks, that for a long time after the cessation of the drain, population might advance so rapidly as to produce among us all the calamities and miseries of an over crowded people.

"We are not now dealing in mere conjecture; there is ample proof of the correctness of these anticipations in the history of our own hemisphere. The West India islands, as we have before seen, are supplied with slaves more cheaply by the African slave trader than they can raise them, and consequently the black population in the Islands nowhere keeps up its numbers by natural increase. It appears by a statement of Mr. F. Buxton, recently published, that the total number of slaves in the British West Indies in 1817, was 730,112. After a lapse of eleven years, in 1828, the numbers were reduced to 678,527, making a loss on the capital of 1817, in the short space of eleven years, of 51,585.* In the Mauritius in the same space of time, the loss on the capital of 1817 amounting to but 76,774, was 10,767.—Even in the Island of Cuba, where the negro slave is treated as humanely as any where on the globe, from 1804 to 1817, the blacks lost 4,461 upon the stock of 1804. 'Prior to the annexation of Louisiana to the United States,' says Mr. Clay in his Colonization Speech of 1830, 'the supply of slaves from Africa was abundant. The price of adults was generally about one hundred dollars, a price less than the cost of raising an infant. Then it was believed that the climate of the province was unfavorable to the rearing of negro children, and comparatively few were raised. After the United States abolished the slave trade, the price of adults rose very considerably—greater attention was consequently bestowed on their children, and now

* See Jones' Political Economy, vol. 1. pp. 51, 52; London edition.

† The longest period of duplication has been about twenty-three years and seven months, so that the addition of one year and five months will more than compensate for the emigration.

* Bryan Edwards attributes the decrease of the slaves in the West Indies principally to the disproportion of the sexes. But in the present instance, we are constrained to attribute it to another cause, for we find of the 730,112 slaves in the sugar islands in 1817, 369,577 were males, and 363, 535 females, being very nearly an equal division of the sexes.

nowhere is the African female more prolific than she is in Louisiana, and the climate of no one of the southern states is supposed to be more favorable to the rearing of her offspring.' For a similar reason now, the slaves in Virginia multiply more rapidly than in most of the southern states;—the Virginians can raise cheaper than they can buy; in fact it is one of their greatest sources of profit. In many of the other slaveholding states this is not the case, and consequently the same care is not taken to encourage matrimony and the rearing of children.

"But our opponents perhaps may be disposed to answer, that this increase of slavery from the stimulus to the black population afforded by the colonization abroad, ought not to be objected to on our own principles, since each slave will be worth two hundred dollars or more, This answer would be correct enough if it were not that the increase of the blacks is effected at our expense both as to wealth and numbers; and to show this, we will now proceed to point out the operation of the scheme under consideration upon the white population. Malthus has clearly shown that population depends on the *means of subsistence*, and will, under ordinary circumstances, increase to a level with them. Now, by means of subsistence, we must not only comprehend the necessaries of life, such as food, clothing, shelter, &c. but likewise such conveniences, comforts, and even luxuries as the habits of the society may render it essential for all to enjoy. Whatever then has a tendency to destroy the wealth and diminish the aggregate capital of society, has the effect, as long as the *standard of comfort** remains the same, to check the progress of the population.

"It is sure to discourage matrimony, and cause children to be less carefully attended to, and to be less abundantly supplied. The heavy burthens which have hitherto been imposed on Virginia, through the operation of federal exactions, together with the *high standard* of comfort prevalent throughout the whole state, (about which we shall by and by make a few observations) have already imposed checks upon the progress of the white population of the state. If not one single individual were to emigrate from the state of Virginia, it would be found, so inert has become the principle of increase in the state, that the population would not advance with the average rapidity of the American people. Now, under these circumstances, an imposition of an additional burthen of 1,380,000 dollars for the purpose of purchase and deportation of slaves, would add so much to the taxes of the citizens—would subtract so much from the capital of the state, and increase so greatly the embarrassments of the whole population, that fewer persons would be enabled to support families, and consequently to get married. This great tax, added to those we are already suffering under, would weigh like an incubus upon the whole state—it would operate like the blighting hand of Providence, that should render our soil barren and our labor unproductive. It would diminish the value of the *fee simple* of Virginia, and not only check the natural increase of population within the commonwealth, but would make every man desirous of quitting the scenes of his home and his infancy, and fleeing from the heavy burthen which would for ever keep him and his children buried in the depths of poverty. His sale of negroes would partly enable him to emigrate; and we have little doubt, that whenever this wild scheme shall be seriously commenced, it will be found that more whites than negroes will be banished by its operation from the state. And there will be this lamentable difference between those who are left behind; a powerful stimulus will be given to the procreative energies, of the blacks, while those of the whites will be paralyzed and destroyed. Every emigrant from among these whites will create a *vacuum* not to be supplied—every removal of a black will stimulate to the generation of another.

'*Uno avulso non deficit alter.*'

"The poverty stricken master would rejoice in the prolificness of his female slave, but pray Heaven in its kindness to strike with barrenness his own spouse, lest in the plentitude of his misfortunes, brought on by the wild and Quixotic philanthropy of his government, he might see around him a numerous offspring unprovided for and destined to galling indigence.

"It is almost useless to inquire whether this deportation of slaves to Africa would, as some seem most strangely to anticipate, invite the whites of other states into the commonwealth. Who would be disposed to enter a state with worn out soil and black population mortgaged to the payment of millions per annum, for the purpose of emancipation and deportation, when in the west the most luxuriant soils, unencumbered with heavy exactions, could be purchased for the paltry sum of $1 25 per acre?

"Where, then, is that multitude of whites to come from, which the glowing fancy of orators has sketched out as flowing into and filling up the *vacuum* created by the removal of slaves? The fact is—throughout the whole debate in the Virginia Legislature, the speakers seemed to consider the increase of population as a sort of fixed quantity, which would remain the same under the endless change of circumstance, and consequently that every man exported from among the blacks, lessened *pro tanto* exactly the black population, and that the whites moving on with their usual speed, would fill the void; which certainly was an erroneous supposition, and manifested an almost unpardonable inattention to the wonderful *elasticity* of the powerful spring of population. The removal of inhabitants, accompanied with great loss of productive labor and capital, so far from leaving the residue in a better situation, and disposing them to increase and multiply, produces the directly opposite effect; it deteriorates the condition of society, and deadens the spring of population. It is curious to look to the history of the world, and see how completely this position is sustained by facts. Since the downfal of the Roman empire, there have been three forced emigrations of very considerable extent, from three of the countries of Europe. The Moors were expelled from Spain, the Protestants from the Netherlands, and the Hugonots from France; each of these expulsions came well nigh ruining the country from which it took place. We are best acquainted with the effects of the expulsion of the Hugonots from France, because it happened nearer to our own times, during the reign of Louis XIV. In this case only 500,000 are supposed to have left France, containing then a population of 20 or 25,000,000 of souls. The energies of this mighty country seemed at once paralyzed by this emigration, her prosperity was instantly arrested, her remaining population lost the vigor which characterized them as long as this *leaven* was among them, and to this day, France has not recovered from the tremendous blow. Her inferiority to England, in industry and all the useful arts, is in a great measure to be traced back to this stupid intolerance of her *great* monarch Louis XIV. The reasons why these expulsions were so very injurious to the countries in question, was because the emigrants were the laboring classes of society, and their banishment consequently dried up the sources of production, and lessened the aggregate wealth and capital of the people. Now these expulsions are *nothing* in comparison with that contemplated by our abolitionists. In France only one in fifty of the population was expelled, and no expense was incurred in the deportation; but in Virginia the proportion to be expelled is much greater, and the expense is to devolve on the government.

"When the emigration is accompanied with no loss of capital to the state, and no abstraction of *productive* labor, then the population will not be injuriously affected, but sometimes greatly benefited. In the hunting state, the expulsion of half of the tribe would benefit

* By standard of comfort, we mean that amount of necessaries, conveniences, and luxuries, which the habits of any people render essential to them.

the remainder in a politico-economical light, because they live on the game of the forest, which becomes more abundant as soon as the consumers diminish. Pastoral nations, for a like reason, are rarely injured by emigration, for they live on cattle, and the cattle live on the spontaneous produce of the earth, and when a colony is sent off, the remainder will generally be benefited, since the consumption is relieved while the production is not diminished. And this satisfactorily explains the difficulty which has so much puzzled historians:—how the north of Europe, which Gibbon, Hume, and Robertson all maintain was in a pastoral state, and not nearly so thickly settled as at present, should nevertheless have been able for several centuries to furnish those terrible swarms of barbarians, who 'gathering fresh darkness and terror' as they rolled on upon the south, at length, with their congregated multitudes, 'obscured the sun of Italy, and sunk the Roman world in night.' This example of the barbarians in the north of Europe, sending so many hundreds of thousands of emigrants to the south, is a beautiful illustration of the capacity of population to counteract the effects of emigration in all those cases where the spring of population is not weakened. As soon as new swarms left the country, the means of subsistence were more ample for the residue; the vigor of population soon supplied the deficiency; and then another swarm went forth and relieved again the national *hive*. Our purchase and deportation of slaves would produce a similar effect on our blacks, but it would be entirely at the expense of both the numbers and wealth of the whites, and would be therefore one of the most blighting curses that could scathe the land. Ireland, at present, is suffering heavy afflictions from an overcrowded population; but her government could not relieve her by sending off the paupers, and for the simple reason that it would require an expense on the part of Ireland which would produce as great or even greater abstraction of capital than of unproductive mouths, and would moreover give more vigor to the spring of population. If other nations would incur the expense for her, then perhaps there might be for her a temporary benefit; but in a short time such a stimulus would be given to population, as would counteract all the vain efforts of man, and in the end, leave her in a worse condition than before. We doubt whether England, France and Germany, by a steady concentration of all their financial resources upon the deportation and comfortable settlement and support of the superabundant population of Ireland, would, at the expiration of fifty years, be found to have lessened the numbers by one single individual. The effect would merely be, to pledge the resources of these three nations to the support of the Irish population, and to substitute the procreation of Irishmen, for that of Englishmen, Frenchmen and Germans, and as soon as this support was withdrawn, the very habits which had been generated by it in Ireland, would be its greatest curse. The only effectual means of relieving Ireland, will be to raise the *standard of comfort* in that country, and to arrest the population by the preventive checks which would lessen the marriages. Until this be done in some way or other, Ireland is doomed to suffer the heavy penalty.

"We are now prepared to explain how it is that so many negroes have been exported from Africa by the slave trade, while the gap, says Franklin, is almost imperceptible. Gen. Brodnax, in his speech, computes the average number now annually sent out from Africa by the operation of the slave trade, to be 100,000; and, he adds, if all this can be effected against so many risks and hazards, and in violation of the laws of God and man, shall it be said that the whole state of Virginia cannot export 6000 to Africa in a year? Yes, strange as it may seem, this is all true; and the simple reason of the great difference is, that Africa incurs no expense, but on the contrary, generally receives a full equivalent for the deported slave, which augments her means of subsistence, and stimulates the spring of population. The slave trade which takes off 100,000 human being from Africa for the slave market of the West Indies and South America, has by its operation quickened the procreative powers of society in Africa to such an extent as not only to keep up her numbers, but to furnish besides 100,000 souls for exportation. Could we suppose it possible for this slave trade to be annihilated at a blow, repugnant and shocking as it is to every feeling of humanity, it would be found that its sudden cessation would plunge the whole of Western Africa for a season into the most dreadful anarchy and appalling distress. It would be found that the habits of the people had been formed to suit the slave trade, and accordingly would be much too favorable to the rapid increase of population without that trade,—prisoners of war would be slaughtered, infants murdered, marriages discouraged, and swarms of redundant citizens sent forth to ravage neighboring countries, and all this would arise from the too rapid increase of population, for the means of subsistence, caused by the sudden stopping of the slave trade. It will be thus seen that the 100,000 annually sent off from Africa, are a source of profit and not of expenditure. Saddle Africa with the whole of this burthen, and we are perfectly sure that the entire resources of that immense continent would not suffice to purchase up, send off, and colonize 5,000 per annum.—There is the same difference between this exportation from Africa, and that proposed by the abolitionists from Virginia, that there is between the agriculturist who sends his produce to a foreign state or country and receives back a full equivalent, and him who is condemned to send his abroad at his own expense, and to distribute it gratuitously. We imagine that no one who was acquainted with the condition of these two farmers would wonder that one should grow wealthy, and the other miserably poor. The 6,000 slaves, which Virginia annually sends off to the South are a source of wealth to Virginia; but the 1,000 or 2,000 whites who probably go to the West are a source of poverty; because in the former case we have an equivalent left in the place of the exported slave—in the latter we lose both labor and capital without an equivalent; and precisely such a result in a much more aggravated form, will spring from this mad colonization scheme, should it ever be carried into operation. If the governments of Europe were silly enough to appropriate their resources to the purchase of our slaves, at their full marketable value, for the purpose of deportation, they should, for aught that we could do, have every one that they could buy. An equivalent would thus be left for the deported slave, and however much others might suffer for their folly, we should escape.

"Against most of the great difficulties attendant on the plan of emancipation above examined, it was impossible for the abolitionists entirely to close their eyes; and it is really curious to pause a moment and examine some of the reflections and schemes by which Virginia was to be reconciled to the plan. We have been told that it would not be necessary to purchase all the slaves sent away—that many would be surrendered by their owners without an equivalent. 'There are a number of slave-holders, (said one who has all the lofty feeling and devoted patriotism which have hitherto so proudly characterized Virginia,) at this very time, I do not speak from vain conjecture, but from what I know from the best information, and this number would continue to increase, who would voluntarily surrender their slaves, if the state would provide the means of colonizing them elsewhere. And there would be again another class, I have already heard of many, while they could not afford to sacrifice the entire value of their slaves, would cheerfully compromise with the state for half of their value.' In the first place, we would remark that the gentleman's anticipation would certainly prove delusive—the surrender of a very few slaves would enhance the importance and value of the residue, and make the owner much more reluctant to part with them. Let any farmer in Lower Virginia ask

himself how many he can spare from his plantation—and he will be surprised to see how few can be dispensed with. If that intelligent gentleman, from the storehouse of his knowledge, would but call up the history of the past, he would see that *mere philanthropy*, with all her splendid boastings, has never yet accomplished one great scheme; he would find the remark of that great judge of human nature, the illustrious author of the Wealth of Nations, that no people had the generosity to liberate their slaves until it became their interest to do so, but too true; and the philosophic page of Hume, Robertson, Stuart, and Sismondi, would inform him that the serfs of Europe have been only gradually emancipated through the operation of *self interest* and not *philanthropy:* and we shall soon see that it was fortunate for both parties that this was the cause.

"But it is strange indeed that gentlemen have never reflected, that the pecuniary loss to the state, will be precisely the same, whether the negroes be purchased or gratuitously surrendered. In the latter case the burthen is only shifted from the whole state to that portion where the surrender is made—thus if we own $10,000 worth of this property, and surrender the whole to government, it is evident that we lose the amount of $10,000; and if the whole of Lower Virginia could at once be induced to give up all of this property, and it could be sent away, the only effect of this generosity and self-devotion would be to inflict the *blow* of *desolation* more exclusively on this portion of the state—the aggregate loss would be the same, the burthen would only be shifted from the whole to a part—the West would dodge the blow, and perhaps every candid citizen of Lower Virginia would confess that he is devoid of that refined incomprehensible patriotism which would call for self immolation on the shrine of folly, and would most conscientiously advise the eastern Virginians never to surrender their slaves to the government without a fair equivalent. Can it be genuine philanthropy to persuade them *alone* to step forward and bear the whole burthen?

"Again; some have attempted to evade the difficulties by seizing on the increase of the negroes after a certain time. Thus Mr. Randolph's plan proposed that all born after the year 1840, should be raised by their masters to the age of eighteen for the female and twenty-one for the male, and then hired out until the net sum arising therefrom amounted to enough to send them away. Scarcely any one in the legislature—we believe not even the author himself—entirely approved of this plan.* It is obnoxious to the objections we have just been stating against voluntary surrender. It proposes to saddle the slave-holder with the whole burthen; it infringes directly the rights of property; it converts the fee simple possession of this kind of property into an estate for years: and it only puts off the great sacrifice required of the state to 1840, when most of the evils will occur that have already been described. In the mean time it destroys the value of slaves, and with it all landed possessions—checks the productions of the state, imposes (when 1840 arrives) upon the master the intolerable and grievous burthen of raising his young slaves to the ages of eighteen and twenty-one, and then liberating them to be hired out under the superintendence of government (the most miserable of all managers,) until the proceeds arising therefrom shall be sufficient to send them away. If any man at all conversant with political economy should ever anticipate the day when this shall happen, we can only say that his faith is great indeed, enough to remove mountains, and that he has studied in a totally different school from ourselves. Let us ask in the language of one of Virginia's most cherished statesmen, who has stood by and defended with so much zeal and ability the interests of Lower Virginia—and who shone forth one of the brightest stars in that constellation of talent which met together in the Virginia convention—'Is it supposed that any tyranny can subdue us to the patient endurance of such a state of things? Every prudent slave holder in the slave holding parts of the state, would either migrate with his slaves to some state where his rights in slave property would be secured to him by the laws, or would surrender at once his rights in the parent stock as well as in their future increase, and seek some land where he may enjoy at least the earnings of his own industry. In the first case, the country would be deserted; in the other it would be abandoned to the slaves to be cultivated under the management of the state. The plan would result in a sacrifice, more probably an abandonment, of our *landed*, as well as the abolition of our *slave* property. Can any thing but force, can any force tame us to wrongs like these?'*

"Again; we entirely agree with the assertion of Mr. Brown, one of the ablest and most promising of Virginia's sons, that the ingenuity of man, if exerted for the purpose, could not devise a more efficient mode of producing discontent among our slaves, and thus endangering the peace of the community. There are born annually of this population about 20,000 children. Those which are born before the year 1840 are to be slaves; those which are born after that period are to be free at a certain age. These two classes will be reared together; they will labor together, and commune together. It cannot escape the observation of him who is doomed to servitude, that although of the same color and born of the same parents, a far different destiny awaits his more fortunate brother—as his thoughts again and again revert to the subject, he begins to regard himself as the victim of injustice. Cheerfulness and contentment will flee from his bosom, and the most harmless and happy creature that lives on earth, will be transformed into a dark designing and desperate rebel. (*Brown's Speech, pp.* 8, 9.

"There are some again who exhaust their ingenuity in devising schemes for taking off the breeding portion of the slaves to Africa, or carrying away the sexes in such disproportions as will in a measure prevent those left behind from breeding. All of these plans merit nothing more than the appellation of *vain juggling legislative conceits*, unworthy of a wise statesman and a moral man. If our slaves are ever to be sent away in any systematic manner, *humanity* demands that they should be carried in families. The voice of the world would condemn Virginia if she sanctioned any plan of deportation by which the male and female, husband and wife, parent and child, were systematically and relentlessly separated. If we are to indulge in this kind of regulating vice, why not cure the ill at once, by following the counsel of Xenophon in his Economies, and the practice of old Cato the Censor? Let us keep the male and female separate† in *Ergastula* or dungeons, if it be necessary, and then one generation will pass away, and the evil will be removed to the heart's content of our humane philanthropists! But all these puerile conceits fall far short of surmounting the great difficulty which, like Memnon, is eternally present and cannot be removed.

'*Sedet eternumque sedebit.*'

"There is $100,000,000 of slave property in the state of Virginia, and it matters but little how you destroy it, whether by the slow process of the cautious *practitioner*, or with the frightful despatch of the self confident *quack*; when it is gone, no matter how, the deed will be done, and Virginia will be a desert."

* The difficulty of falling upon any definite plan which can for a moment command the approbation of even a few of the most intelligent abolitionists, is an unerring symptom of the difficulty and impracticability of the whole.

* Letters of Appomattox to people of Virginia, 1st Letter, p. 13.

† See Hume's Essay on the populousness of ancient nations, where he ascribes this practice to Cato and others, to prevent their slaves from breeding.

Undoubtedly the condition of a slave is deplorable, and it must ever be afflicting that such a state should exist, and be extended so widely over the globe, as to seem to be the inevitable lot of a large portion of mankind. But in our benevolent zeal for the removal of slavery, we should not forget that there are afflictions, numerous, wide-spread, and unavoidable in the most refined and advanced state of society, that are even more intolerable than the slave's toil, stimulated by the slave-owner's lash. The substance, though not the name of slavery is to be found almost every where in this miserable world—and the few favored spots now free from such causes of human suffering, must in their turn be visited with like inflictions. Except in newly settled countries, or in others having as yet a sparse population and plentiful means of subsistence, and a free government withal, the laboring poor are slaves in fact, either to individuals, to government, or to their own craving and never satisfied necessities. The negro slaves of Virginia present striking examples of the first kind—the people of Egypt, and emancipated Hayti of the second—and the entire laboring population of free and philanthropic England of the third. Of these three kinds, personal slavery as existing in Virginia, is the most injurious, or the least profitable, to the masters, and attended with the least unhappiness (so far as mere animal comforts are considered) to the slaves; and where hunger is the only taskmaster, its victims are the most miserable of slaves, and yet compelled to yield the greatest possible net amount, by their labor, and abstinence from enjoyment. If a rich English manufacturer, or landholder, was offered all the laborers in his employment, with their wives and children, and all their property, to be held precisely as the negro slaves are held and maintained in Virginia, considerations of economy alone would instruct him to reject the fatal gift, as he would avoid certain bankruptcy and ruin. On the other hand, if all the slaves of Virginia were at once emancipated, and left to provide for themselves, want, wretchedness and disease, would make such havoc among them, as to threaten finally, and at no remote period; the extinction of the race. The adult males, and even the females not burthened with children, might possibly do well; but the greater number of the feeble and infirm, from old age, infancy, or disease, would inevitably perish. Marriages would nearly cease, and births greatly diminish, and the work of death proceed as if a general pestilence was raging. The effects of emancipation in equal time, would diminish the African race in Virginia, more than the operation of any scheme that philanthropy has yet devised, though aided by the general will, and all the disposable wealth of the country.

HARVEST MANAGEMENT.

To the Editor of the Farmers' Register.

Sir—The interesting season is approaching when, if ever, the following hints on the management of the wheat harvest will be useful. They are furnished rather in compliance with your wish than from any confidence I have in their merit. Your partiality has caused you to form expectations which are not, I fear, destined to be realized. There are sources, whence you may derive much and valuable information on this subject, and on another equally important, the management of wheat fallows. I refer to my friends of Shirley and Westover, with whose distinguished success in the culture of the wheat crop you are not unacquainted. Communications from them on these subjects would, I venture to affirm, be among the most important with which the pages of the Register could be enriched. To myself, individually, they would be fraught with interest.

To get ready previously to commencing harvest, is the first and fundamental rule. It should be borne in mind that, in this critical operation, as much may sometimes be done in one or two good days as in a whole unfavorable week, independently of the injury sustained by the grain. Abundant and timely preparation should, therefore, be made; a supply of meal laid in, extra implements, timber fashioned out for prompt use, &c. provided. In fine, every thing that can, should be done, to prevent interruption. When many laborers are engaged, and at a distance from the work-shop, as is often the case in Virginia, a carpenter should follow the reapers with tools, timber, and grindstone, so as to afford, in fact, an ambulatory shop. When not employed grinding the scythes and making repairs, he may be with the shockers. Food and water should be hauled in a cart, by which some labor may be saved. For the latter, barrels should be provided, with an aperture in the upper side, and a flap of stout leather over it, to prevent the water from splashing out. One of these should always be convenient to the hands, to whom the water may be carried without their leaving the ranks.

The next rule is to commence as early as possible. This may be done when the straw is dry a short distance below the head, if the weather be fine. Do not wait for large bodies of wheat, but begin with those spots that ripen first. Let the reapers be an hour or two in advance of the binders, and set the sheaves in stooks till fit to be shocked. If left long on the ground, as it is discharged from the cradle, exposed to our scorching sun, the straw is too suddenly dried up, and the grain denied the nourishment necessary to its perfection. The skin of wheat cut thus early, is thin and bright, though some persons think the practice more advantageous to the miller than the farmer; and it would, perhaps, be so, could there be a guaranty against rain, by which both too frequently suffer. It is certainly better to cut wheat rather green, when properly managed, than to cut it wet, which persons are not unfrequently obliged to do in a protracted harvest. Light wheat, too, may be cut with more expedition and less waste when the stem is somewhat succulent, than when dry and brittle, as it becomes at the end of a long harvest.

Cut that portion of the wheat first of which you can secure most. It should never be cut when too wet to be tied in sheaves, and soon shocked.—Wheat cannot possibly be in so good a situation to dry rapidly as when standing erect in the field. Much more has been lost in our warm climate, by its sprouting in the sheaf and the shock, than from exposure when standing in the open field. At a juncture so busy, despatch should be the farmer's watchword. Every hand should be turned out, who can render the least service; the old as shockers, the very young as sheaf carriers,—without, however, exacting too much from either.

My cradles are now all constructed on the same

scale, adapted to blades fifty inches in length. Most of my implements, indeed, are made on this principle, so that the sound parts of one may fit when transferred to another. The reap hook is never used. In wheat which is too much tangled for the cradle, the naked blade is employed. Each binder is furnished with a small rake having a handle two and a half feet long, with which he hastily gathers as much wheat as he can, to diminish the quantity left on the ground. A horse rake follows as speedily as possible, and the loose wheat thus collected, is either put in small cocks, or, which is greatly preferable, hauled in at once, and housed or stacked. A friend in Berkeley county informed me that a German had introduced there a better method of gleaning fields than by the help of a horse, the rake being so constructed as to be drawn by a man, with a strap around the body. I have written to ask a more particular description, and will furnish you a copy when I receive it.

Never during harvest, open damaged shocks, unless the weather be good, and then not too many at a time. After harvest there should be an immediate and general inspection. I have found it convenient to set the shocks straight one way, but in the middle of the cutting the other, to save distance in carrying the sheaves. The shocks should be of an oval form, nicely balanced to prevent their leaning, with a high and sharp apex, well capped. In order to bring them to a proper point, some very small sheaves must be made.

Harvest, though a period of intense labor, is nevertheless, in Virginia, a sort of negro festival. It is pleasing to witness the merry faces on such occasions. I think the usual allowance of ardent spirits a wholesome corrective of the vast quantity of water rendered necessary by the heat and exercise. But be that as it may, I should be loath to abridge the enjoyment of the poor creatures, by making them members, by compulsion, of the temperance society. To those who prefer it, an equivalent of molasses may be given.

I will not close this article without first offering a fervent wish for your success, and that of the great cause with which you have identified yourself.

AGRICULTOR.

May 29th, 1833.

MANGEL WURTZEL FOR CATTLE.

By the Editor of the American Farmer.

Last year we made an experiment with mangel wurtzel for cattle, and the result was highly satisfactory—so much so that we shall hereafter adopt it in preference to all other root crops for the purpose. Having about the sixth of an acre of ground prepared for early corn for which we had not seed enough, we determined to plant it in mangel wurtzel as an experiment, having very little confidence in its equality with ruta baga. We accordingly soaked the seed twenty-four hours in warm water, laid off furrows about two feet apart, and dropped the seed six or eight inches apart, covering it as we do corn. When the plants were up, we passed over the field with a weeding hoe, and subsequently run a small plough through it twice, clearing out the weeds with a hoe. This is all the cultivation it had, and we feel certain that all the work bestowed upon it, including the original preparation of the ground for corn, did not amount to more than two full days' work for one man. We put no manure on the ground, though it had been manured the year before for potatoes, and for planting in early York cabbages, which were killed by the severity of the winter. The soil was a fair medium mould, a mixture of sand, clay and vegetable matter; high ground, but level. When the mangel wurtzel was gathered, it was estimated by every one at seventy-five bushels; some more, but none less. It was also perfectly evident that we might have taken at least one-fourth more, if not double the quantity, from the same ground, had we planted more carefully, and laid the rows fifteen or eighteen inches apart, instead of two feet. There were many places in the rows where there was not a plant for six or eight feet; and then again many places where they were so crowded that the roots could not fairly develope themselves.

As food for cattle, especially for milch cows, our experiment was as follows: In October, our best milch cow began to fail in her milk, and we cut an arm full of the tops of the mangel wurtzel for her; this seemed to have a good effect, and it was repeated night and morning for a week, when she fully recovered her usual supply. The leaves were then withheld, and she immediately failed again in her milk. At that time her full quantity was about twelve quarts a day, and when the mangel wurtzel leaves were withheld, the quantity she gave was only about six quarts. She had a good pasture, with an excellent stream of water in it, and plenty of salt during the time; but at that season the grass does not afford sufficient nutritive matter.

After another week we began giving her the roots of the mangel wurtzel, cut small, and occasionally sprinkled with shorts or corn meal, and a little salt; one peck of the roots given thus, had the same effect on her milk that the tops had; and we suspended these a week, to try their effect the more certainly. The result was as above stated, a conviction that mangel wurtzel is the best and most profitable root we can raise for milch cows.

After cutting off the leaves, they very soon grow out again, so that they may be cut every fortnight. But we think it better to select the largest roots from crowded places, and give them tops and all; as we think the new growth of leaves is at the expense of the roots.

EXPERIMENTS ON THE EARLY GATHERING OF CORN.

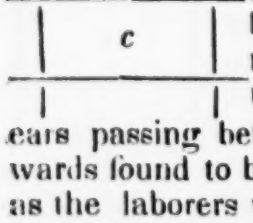
For the Farmers' Register.

So many advantages attend our general practice of making corn a preparing crop for wheat, that we will probably adhere to it on all soils suitable to both crops, notwithstanding the alleged impropriety of one grain crop following another. Besides this succession being opposed to theoretical views of the rotation of crops, there are also practical objections to all the various modes adopted for clearing the land of the first crop, for the purpose of preparing for and sowing the second. Formerly, the slovenly and yet most troublesome plan of sowing and ploughing in wheat between the rows of standing corn, was universal—it being believed that corn could not be cut up with safety, early enough to sow wheat. Now, the stalks are dug up, or cut off at the surface of the

earth, and put up in *shocks*, to remain on the field until wheat sowing is done, and the corn is dry enough to put away in houses. The manner in which corn is shocked is varied much by different farmers; but in every way there is much labor lost by twice moving the corn and stalks—and the wheat is more or less injured by the final carting away of both. To avoid these disadvantages, I have tried gathering the corn before sowing wheat, and drying it in covered and ventilated pens, which plan, I have been informed has been long practised to some extent in Nottoway. The blade fodder and tops of corn are usually secured in stacks (or might be) before the first of October, and on good and warm soils, still earlier. It is seldom safe in eastern Virginia, to sow wheat before the 10th of October, on account of the Hessian fly; and this interval of ten days or thereabout, may be used for the operation I propose. But before making more general observations, I will give the details of my experiments, and in substance, as noted in my memorandum book at the several times.

Experiment I.

September 22d, 1832. Began to gather the corn from a field of 18 acres, which the after measurement showed to have produced 88 barrels. The land was unequal in quality, and of course so was the corn in maturing. The ears were carted home, shucked, and put up in pens in the following manner: On three sleepers, or logs of six to eight inches through, laid parallel on the ground, common fence rails were laid across, so as to form a floor. The pen was built on this floor of similar rails, forming a square of nine feet inside measure; having a flue (*a*) of four inches through the pen, made by laying two other rails at that distance apart, through the middle. The flue, together with the rails forming it, took up near a foot of the space within the pen, so that the two partitions (*b* and *c*) intended to contain the corn, were each nine by four feet. The side rails were notched where they crossed, so as to lie close enough to prevent the ears passing between. This trouble was afterwards found to be not only useless but injurious—as the laborers were so much on the corn as to shake down the ears closer than they ought to lie. As fast as three or four rails were put up on each side, the spaces were filled with ears. The corn was 9½ feet high on the 25th, when the pen was completed, and covered with corn stalks a foot thick, and sloping enough to pass off the rain. It held 56 barrels of corn, or twice that bulk in ears. The gathering and shucking were continued, and a second pen of like dimensions was finished on the 27th, and a third on the 1st of October. The stalks had been carted off the field, and many of them to the hog pen, as all that were green were eaten by the hogs.



The stacking of my top fodder that year was begun the 12th of September, from which it may be inferred that the corn must have ripened more early than usual. From the 21st of September, the weather was uncommonly cool, and on the 1st of October there was white frost.

October 7th. Discovered that some of the corn in the oldest pen was mouldy, and believing that all was in danger, the two first pens were hastily pulled down, and the corn sorted and spread over vacant floors. There is no statement of the amount of damaged corn, nor does my memory supply the omission: but it was so much less than was expected, that the third pen was allowed to stand until the 22d of November, when it was housed, and found to be perfectly sound, with the exception of 20 to 50 ears. This was the latest gathered, and from better land, and therefore was the driest corn when penned.

The loss sustained from this experiment was apparently caused by not being sufficiently careful in separating the unripe ears.

Experiment II.

1824. A pen of like size and construction was filled from a few acres of rich bottom land, and some adjacent high land. At what precise time it was done was not noted, as I was absent on a journey: but it was believed to have been in the last days of September. This remained in the pen until nearly the last of December, and proved to be as sound and dry as any corn whatever.

Experiment III.

Though this plan greatly lessens the whole labor of harvesting corn, removing stalks, and sowing wheat, still it requires more work, (or spare hands,) during the time of the operation—and sufficient time and opportunity were not again offered for the purpose until 1832.

Every corn grower in lower Virginia must remember how unusually late the crop was in ripening in 1832. The grain continued soft and milky so long, that the fodder could not be stripped within twelve days of the usual time. Indeed, if we had waited until all the shucks had lost their green color, and no milk remained in the grain, the fodder would have been so dried as not to be worth gathering. Still, my crop being very small for the labor employed, I was enabled to secure all the fodder by the last day of September.

Having previously decided to adopt this plan of early gathering this year, the gathering was commenced on the 4th of October, and continued through the 5th. The part to be gathered was selected, because it contained seven or eight acres of the poorest land in the field, which it was desirable to aid with manure, before sowing in wheat—without considering that the poorest land would of course have the latest corn. This order so thoughtlessly given, was as thoughtlessly obeyed: and on visiting the work on the 5th, the damage had been carried too far to be entirely remedied. All the ears were pulled off—mostly carted to the pens for shucking, and thirty barrels or more shucked. It was obvious that much of the corn (from the poorest land,) was too green and full of sap for gathering. Nor could all the green ears be separated after shucking, as the eye did not discover their condition, and the laborers would not exercise enough care, nor had they enough judgment to make a proper separation. The quantity shucked too (mostly the night before,) had been thrown to the heap from where the laborers stood, or distances of five to ten yards. This had necessarily bruised or wounded some of the grains of many of the sappy and heavy ears—and my former trials had shown that the grains so wounded would mould or rot, though without that injury the whole ear might have kept sound. This error was stopped, and the remaining ears were placed in baskets

as shucked, and sorted, so as to leave out the greenest and the already rotten corn.

Two pens were begun and carried on together. One was built in the same manner as formerly, except that the rails were not notched at all, except near the bottom of the pen. This saved much trouble, and admitted air more freely. The dryest corn, so far as it was obtained by careless negroes, was used to fill this, and was emptied in from baskets as the building rose. The laborers were not allowed to stand on the corn, that it might lie the more open. Ears were placed on end, with some care, along the widest openings between the rails, to prevent any falling through. The second pen was of the same size of base, nine feet square within the side rails; but for greater safety, was given two parallel flues, which divided the space to be filled with ears into three parts, each 9 by 2½ feet. One of the outer parts was filled nearly to the top with the greenest of the ears that were sound, and tolerably well filled. The balance of this compartment, and the whole of both the others, received the drier corn, such as filled the first pen. The first was raised to fourteen feet, and the second to eleven, and both contained from 120 to 130 barrels of corn. After taking off these two sorts of corn, there remained the rotten (or rotting) ears, those most imperfectly filled with grain, and the greenest and softest of all, from late replanting. Altogether, this parcel contained nothing that would have been fit for sale if it remained in the field, or for any other use, except to feed hogs. This was laid on a floor similar to those of the other parcels, and penned without any partition, or flue, as it was expected to be used for fattening hogs before it would suffer damage. This bulk was three to four feet thick in the middle, but thinner at the sides, and only covered by loose shucks. Several days past before the hogs could be put up, which delay caused this parcel to be that much longer on hand than was expected. Several rains fell on its cover of loose shucks, and it was not dried or removed. In fact, the quantity of corn was so small, and in the course of being rapidly consumed, that the overseer neither examined it, nor thought of its being in danger, until too late. The last of it rotted, and there was a loss of about ten bushels of grain, which the slightest care might have prevented.

The pens were covered by cornstalks, laid straight, and about a foot thick, raised to a ridge across the middle, and forming eaves projecting two feet over the north and south sides. The corn was closely watched, and with much alarm for its safety, for twelve or fifteen days. Within three days after the pens were finished, a few ears on the north of the first pen, so near the outside as to be exposed to the eye, began to show a white mould forming in some spots; but they were left undisturbed, and the damage did not appear to extend much farther. The interior of the bulk was examined by pulling out enough ears in other places, and found in good condition. No scent, nor other indication of sweating or heating was perceived.

On December the 7th, the pens were emptied, and the corn again sorted, and put away in the house. By cutting an opening through a few of the bottom rails of each division, the ears come down as fast as required. Every rotten and damaged ear was thrown out, and the whole appeared to the eye about equal to a bushel of grain.—Perhaps fifteen or twenty ears were entirely rotten. All besides was sound, in perfectly good condition, and uncommonly dry for the time of year, so as to shatter considerably in the condition. I examined particularly the emptying of the partition which contained the greenest corn, and found it as sound as any. But many of the ears, though sound, were so shrunk as to offer abundant evidence of their very green and sappy state when gathered and put up. Others that were plump and well filled, remained bent by the pressure they had suffered in the pen; and even the grains in some spots were indented and altered in position by the pressure of another ear, without being otherwise affected. Some others, however, showed mouldiness at such indented spots. Altogether, the loss in the pens from both rotting and mouldiness was very inconsiderable, and less than would have been sustained if the corn had remained either standing or in shocks in the field. The shrivelled ears did not suffer either from penning or two early gathering—but from having the fodder taken off before the grain was enough advanced. The plant is effectually killed when deprived of its top and leaves; and the ear may be as safely pulled within three or four days after, as at any later time, if it can be kept as well exposed to the sun and air.

The gross error committed in gathering for this experiment so much of the greenest corn, caused much trouble and still more alarm. But even with that blunder, I think there was no loss of crops sustained, except in the parcel used for hogs, which also was caused by neglect. When these pens were completed, the whole of the balance of the field might have been safely gathered for penning; but I feared to proceed with even drier corn, when 130 barrels were considered already at great risk. I therefore proceeded to cut off the remainder of the corn, and carted the whole to the ground before the cribs, and ricked it, by the opposite rows of stalks being made to lean against each other across poles on low forks. The width across the tops of these ricks, where the ears were, was generally from six to ten feet; and about the 15th of October, one place (for want of room at that time,) was set up between twelve and fifteen feet across the top, which was considered safe, from the dry state of the corn then brought in. But this spot was damaged by the thickness of the rick, and about one to one and a half barrels of corn was found when gathered, to be partly or entirely rotted. This corn, from the better quality of the land, was much more matured than the greenest part penned, at the time when the latter was gathered.

Another examination was made of the corn that had been penned in March 1833. Its good condition continued, nor was any difference from other corn perceptible, except that the large end of the cob generally appeared darker. Eight or ten acres of my present crop were planted from this corn, which was found to vegetate as well as the adjoining, planted with other seed. We are now using the same for bread, and can discover no objection to its quality.

The results of all these experiments prove that corn may be safely gathered a month earlier than is usual; and the errors that have been stated, and the consequent losses, probably may serve as

warning enough to guard against every danger. A sufficient guide to show when the large and soft grained corn (such as mine was,) is fit to gather, is the shuck having lost its green color, and the grain being firm, and clear of milk; and on rich and warm soils, corn is often in that state by the 20th of September. The advantages of this plan are these: 1. The whole labor of moving of the corn and stalks, is much less than in any of the usual modes of first carrying them to shocks, and carting them home after the wheat is sowed; 2. The shucks and stalks are saved for food or for manure, when more full of sap, and much richer for both purposes than they can be after exposure to the weather, until late in November, even if a wet season does not keep them much longer in the field; 3. The whole field is cleared for ploughing, and sowing wheat, so as to allow that important operation to be performed in the best and cheapest manner. Clear space is also given for applying to wheat whatever manure may be on hand and ready for use. It may not be practicable or desirable to gather the whole crop of corn in advance of our wheat sowing; but if only one third is so managed, it will permit the preparation for wheat to be advanced ten or fifteen days, and at a time when, on corn farms, horses are generally without employment. E. R.

May 4th, 1833.

SLIDE OF ALPNACH.

From Babbage's Economy of Machinery and Manufactures.

Amongst the forests which flank many of the lofty mountains of Switzerland, some of the finest timber is found in positions almost inaccessible. The expense of roads, even if it were possible to make them in such situations, would prevent the inhabitants from deriving any advantages from these almost exhaustible supplies. Placed by nature at a considerable elevation above the spot on which they are required, they are precisely in fit circumstances for the application of machinery; and the inhabitants constantly avail themselves of it, to enable the force of gravity to relieve them from some portion of their labor. The inclined planes which they have established in various forests, by which the timber has been sent down to the water-courses, must have excited the admiration of every traveller; and these slides, in addition to the merit of simplicity, have that of economy, as their construction requires scarcely any thing beyond the material which grows upon the spot. Of all these specimens of carpentry, the Slide of Alpnach was by far the most considerable, both from its great length, and from the almost inaccessible position from which it descended. The following is the description of that work given in Gilbert's Annalen 1819, and translated in the second volume of Brewster's Journal:

"For many centuries, the rugged flanks and the deep gorges of Mount Pilatus were covered with impenetrable forests. Lofty precipices encircled them on all sides. Even the daring hunters were scarcely able to reach them; and the inhabitants of the valley had never conceived the idea of disturbing them with the axe. These immense forests were, therefore, permitted to grow and to perish, without being of the least utility to man, till a foreigner, conducted into their wild recesses in the pursuit of the chamois, was struck with wonder at the sight, and directed the attention of several Swiss gentlemen to the extent and superiority of the timber. The most intelligent and skilful individuals, however, considered it quite impracticable to avail themselves of such inaccessible stores. It was not till November, 1816, that M. Rupp, and three Swiss gentlemen, entertaining more sanguine hopes, drew up a plan of a slide, founded on trigonometrical measurements. Having purchased a certain extent of the forests from the commune of Alpnach for 6000 crowns, they began the construction of the slide, and completed it in the spring of 1818.

"The slide of Alpnach is formed entirely of about 25,000 large pine trees, deprived of their bark, and united together in a very ingenious manner, without the aid of iron. It occupied about 160 workmen during eighteen months, and cost nearly 100,000 francs, or £4,250. It is about three leagues, or 44,000 English feet long, and terminates in the Lake of Lucerne. It has the form of a trough, about six feet broad, and from three to six feet deep. Its bottom is formed of three trees, the middle one of which has a groove cut out in the direction of its length, for receiving small rills of water, which are conducted into it from various places, for the purpose of diminishing the friction. The whole of the slide is sustained by about 2,000 supports; and in many places it is attached, in a very ingenious manner, to the rugged precipices of granite.

"The direction of the slide is sometimes straight, and sometimes zig-zag, with an inclination of from 10° to 18°. It is often carried along the sides of hills and the flanks of precipitous rocks, and sometimes passes over their summits. Occasionally it goes under ground, and at other times it is conducted over the deep gorges by scaffolding 120 feet in height.

"The boldness which characterizes this work, the sagacity displayed in all its arrangements, and the skill of the engineer, have excited the wonder of every person who has seen it. Before any step could be taken in its erection, it was necessary to cut several thousand trees to obtain a passage through the impenetrable thickets; and, as the workmen advanced, men were posted at certain distances in order to point out the road for their return, and to discover, in the gorges, the places where the piles of wood had been established. M. Rupp was himself obliged, more than once, to be suspended by cords, in order to descend precipices many hundred feet high; and, in the first months of the undertaking, he was attacked with a violent fever, which deprived him of the power of superintending his workmen. Nothing, however, could diminish his invincible perseverance. He was carried every day to the mountain in a barrow, to direct the labors of the workmen, which was absolutely necessary, as he had scarcely two good carpenters among them all; the rest having been hired by accident, without any of the knowledge which such an undertaking required. M. Rupp had also to contend against the prejudices of the peasantry. He was supposed to have communion with the devil. He was charged with heresy, and every obstacle was thrown in the way of an enterprise, which they regarded as absurd and impracticable. All these difficulties, however, were surmounted, and he had at last the satisfaction of observing the trees descend from the mountain

with the rapidity of lightning. The larger pines, which were about a hundred feet long, and ten inches thick at their smaller extremity, ran through the space of *three leagues*, or nearly *nine miles, in two minutes and a half*, and during their descent, they appeared to be only a few feet in length. The arrangements for this part of the operation were extremely simple. From the lower end of the slide to the upper end, where the trees were introduced, workmen were posted at regular distances, and as soon as every thing was ready, the workman at the lower end of the slide cried out to the one above him, "*Lachez*" (Let go.) The cry was repeated from one to another, and reached the top of the slide in *three* minutes. The workman at the top of the slide then cried out to the one below him, "*Il vient*" (It comes,) and the tree was instantly launched down the slide, preceded by the cry which was repeated from post to post. As soon as the tree had reached the bottom; and plunged into the lake, the cry of *Lachez* was repeated as before, and a new tree was launched in a similar manner. By these means a tree descended every five or six minutes, provided no accident happened to the slides, which sometimes took place, but which was instantly repaired when it did.

"In order to show the enormous force which the trees acquired from the great velocity of their descent, M. Rupp made arrangements for causing some of the trees to spring from the slide. They penetrated by their thickest extremities no less than from eighteen to twenty-four feet into the earth, and one of the trees having by accident struck against the other, it instantly cleft it through its whole length, as if it had been struck by lightning.

"After the trees had descended the slide, they were collected into rafts upon the lake, and conducted to Lucerne. From thence they descended the Reuss, then the Aar to near Brugg, afterwards to Walshut by the Rhine,, then to Basle, and even to the sea, when it was necessary.

"In order that none of the small wood might be lost, M. Rupp established in the forest large manufactories of charcoal. He erected magazines for preserving it when manufactured, and had made arrangements for the construction of barrels for the purpose of carrying it to the market. In winter, when the slide was covered with snow, the barrels were made to descend on a kind of sledge. The wood which was not fit for being carbonized, was heaped up and burnt, and the ashes packed up and carried away, during the winter.

"A few days before the author of the preceding account visited the slide, an inspector of the navy had come for the purpose of examining the quality of the timber. He declared that he had never seen any timber that was so strong, so fine, and of such a size; and he concluded an advantageous bargain for 1000 trees.

"Such is a brief account of a work undertaken and executed by a single individual, and which has excited a very high degree of interest in every part of Europe. We regret to add, that this magnificent structure no longer exists, and that scarcely a trace of it is to be seen upon the flanks of Mount Pilatus. Political circumstances having taken away the principal source of the demand for timber and no other market having been found, the operation of cutting and transporting the trees necessarily ceased."

Professor Playfair, who visited this singular slide, states, that six minutes was the usual time occupied in the descent of a tree; but that in wet weather; it reached the lake in three minutes.

SUPPOSITION OF A NEW POWER FOR MACHINERY.

The most portable form in which power can be condensed is, perhaps, by the liquefaction of the gases. It is known that, under considerable pressure, several of these become liquid at ordinary temperatures. Carbonic acid, for example, requires a pressure of sixty atmospheres to reduce it to a liquid state. One of the advantages attending the use of these fluids is, that the pressure exerted by them remains constant until the last drop of liquid becomes gaseous. If either of the elements of common air should be found to be capable of reduction to a liquid state before it unites into a corrosive fluid with the other ingredient, then we shall possess a ready mean of conveying power in any quantity and to any distance. Probably hydrogen will require the strongest compressing force to render it liquid, and may, therefore, possibly be applied where still greater condensation of power is wanted. In all these cases the condensed gases may be looked upon as enormous springs, which have been wound up by the exertion of power, and which will deliver the whole of it back again when required. These springs of nature differ in some respects from the steel springs formed by our art; for in the compression of the natural springs an enormous quantity of latent heat is forced out, and in their return to the state of gas an equal quantity is absorbed. May not this very property be employed with advantage in these applications?

The mechanical difficulty which will remain to be overcome, will consist in the valves and packing necessary to retain the fluids under the pressures to which they will be submitted; and the effect of heat on these gases has not yet been sufficiently tried to lead us to any very precise notions of the additional power which its application to them will supply.

The elasticity of air is sometimes employed as a spring instead of steel: in one of the large printing presses the momentum of a considerable mass of matter is destroyed, by making it condense the air included in a cylinder, by means of a piston against which it impinges.—[*Ibid.*

PUBLIC WORKS FOR FACILITATING TRANSPORTATION. PETERSBUNG RAIL ROAD.

Petersburg, 6th Dec. 1832.

SIR—I am requested by the president and directors of the Petersburg rail road company, to communicate to you, for the information of the board of public works, an account of the condition and cost, and my own impressions of the prospects of the work committed to my charge.

Its objects, as the board are no doubt apprised, were to connect the Roanoke river at a point where there must be necessarily a trans-shipment of produce from one description of boats to another, with the town of Petersburg to accommodate much better, and of course to command the trade of the upper Roanoke, and to afford the lower Roanoke country and a large part of the interior of North

Carolina, a readier and cheaper way to a market than they now have.

A careful examination of the subject, satisfied the board of directors, that an improvement of a superior character was well justified by the ends in view; and on the other hand, that the trade of the Roanoke and of the districts of North Carolina, which the contemplated rail way was to reach, would be diverted but partially from its accustomed channels, by a work of an inferior order. It seemed to the board also advisable, in the execution of their work, to attempt, not only the objects which first led to its being projected, but others, which it was seen might be subsidiary to the end of making it a profitable investment to stockholders.

By adapting the plan and profile of the rail road to the use of locomotive power, it was evident, that not only a much more perfect accommodation would be afforded to trade and passengers, but that an important facility would be given to the post-office department in the transmission of its mails, for which, it was presumed the government would be willing to award a liberal and adequate remuneration.

With these objects in view, a rail road was located between the town of Petersburg and the Roanoke river, at a point one and a half miles below its falls, unsurpassed, and it is believed, unequalled in directness, in freedom from curvature and beauty of graduation, by any similar work of the same extent. The whole length from the depot in Petersburg to that on the Roanoke, is but fifty nine miles, or three and one eighth miles more than a straight line between these would be.

Most of its curves are arcs of circles of from two to nine miles in diameter, and its graduation in no place (after leaving the town of Petersburg) exceeds a rise or fall of thirty feet per mile.

It would have been a subject of gratification to the board of directors and their officers, if the construction of their work could have corresponded in all respects with the excellent location which was obtained for it. It was evident, however, that the resources of the company would not be adequate to a work of the most permanent character *throughout*, and it became therefore a subject of consideration, in what respects retrenchment could be made, without impairing its usefulness and value.

The conclusion arrived at, was to execute the rail road on the plan contemplated by the undersigned in a report of the 8th of April 1830, to the common council of Petersburg. The graduations of the road and the masonry of the bridges, culverts and other constructions, being on the most permanent plan, whilst a *superstructure* of a more economical character, it was thought, might be admitted, in place of the stone and iron superstructure generally adopted in England, and on some few of the rail roads in this country.

It is doubtful whether if the funds of the company had been more ample, good judgment would have dictated a different course from that which was determined on. Temporary constructions are undoubtedly in most cases to be avoided on public work. If, however, they are in any case admissible, they would seem to be so in the superstructure of a rail road. In the present instance, a track of wood and iron, of a highly substantial character, (heart yellow pine rails 5 by 9, plated with iron $\frac{1}{2}$ inch thick by 2 inches wide, secured in white oak sills 12 inches in diameter,) will have been laid at a cost of less by two thirds than would have been necessary to lay down iron rails on stone blocks. Its average duration is about ten years, and before it decays it may be made use of to put in place the materials, and thereby defray a large portion of the cost of a more permanent construction.

Condition and Cost of the Work. At this time four fifths of the labor of *grading and bridging* on the Petersburg rail road may be considered as effected, and the remainder, if the winter should be favorable, may be expected to be finished by the first of June next.

Of *superstructure*, the first thirty miles from the corporation line are completed, and the rail road for that distance has been in use for the last six or eight weeks. The remaining distance to the Meherrin, and the portion of the rail road within the corporation line (if the weather should be favorable) may be completed in the course of a few weeks; so that by the first of February, at farthest, the company may expect to open their rail road between Petersburg and Hicks' ford (forty one miles) for transportation. The remaining distance between the Meherrin and Roanoke is so far advanced as to leave little doubt of its completion within less than twelve months from this time, and that the whole line of rail road, if no untoward circumstance should occur, may be opened to the Roanoke in the month of November next. By that time the necessary depots and warehouses for the accommodation of the trade will have been constructed, the engines and cars requisite procured, and all other arrangements for transportation made.

The cost of the rail road, so far as it has been completed, has been entirely within the original estimate; and on those parts which are yet to be completed, there will, with one exception, be no material variation. On the portion within the corporation of Petersburg, the amount assessed against the company for damages has been greater than was anticipated, and an extra expenditure of about $12,000 will be incurred in order to avoid an inclined plane at the termination of the rail road, which had been at first contemplated. On the other items of expense yet to be incurred, there will as often be a reduction as an increase on the prices allowed in the estimate, and the whole work will, at any rate, be executed for the sum contemplated ($400,000) at the period of its commencement.

An increase of capital or a loan of money will, however, be requisite, in order to procure the necessary locomotive engines, cars and carriages for the purposes of transportation, and to give to the trade of the road a sufficiently extensive accommodation, in the way of warehouses and depots. The extent to which this will be requisite, will depend on the views of the board of directors and of the stockholders, and on circumstances yet to be ascertained. It will be important that the company should be in these respects adequately and amply provided, and particularly so in the event of the transportation of the mail being effected by it.

Prospects of the Company. It has seldom occurred in Virginia that the results of a work have equalled the expectations of its projectors. It is confidently believed that the Petersburg rail road will form an exception to the rule.

The easy curvatures and gentle graduation of the road have been before alluded to. These and a careful execution, will give to the power employed on it a large useful effect, and enable locomotive engines to attain the highest desirable velocity with entire safety. It has been mentioned above, that one half of the rail-road was opened for transportation in the month of October; since then, a light engine, but little upwards of four tons gross, has been engaged in nearly daily trips on this distance, transporting from 18 to 20 tons net, or from 30 to 33 tons gross, in an average period of $2\frac{1}{2}$ hours. So far, the cost of her repairs has not been five dollars, and the fuel consumed by her has been but about half a cord of wood per day.

It is agreed that the above is an unusual case, and that the performance of their engines generally will scarcely equal that of the beautiful locomotive, with which the board of directors have commenced their transportation. Still, with large deductions and allowances, the saving in the cost of transportation, as well as in time, by their improvement, and its efficiency when it meets the Roanoke, can scarcely be questioned. I must leave to others, more conversant than myself with the trade of the Roanoke, and with that of Petersburg beyond this stream, to estimate its amount and probable increase on the completion of the rail-road. On that subject the information in my possession is scarcely definite enough to admit of my hazarding an opinion. If it is such as has been confidently stated to be, there can scarcely be a doubt of the productiveness of the rail-road, within a very brief period. I am, sir, very respectfully your obedient servant,

M. ROBINSON, *Engineer.*

To James Brown, Jr. Second Auditor.

The following extract from a letter from Donald Mackenzie, Esq. President of the Petersburg Rail-road Company, in answer to our inquiries on this subject, presents the still later operations connected with this important and valuable public work.

"*Petersburg, April* 28, 1833.

"On the 24th December last, forty one miles of the road were completed and has been in regular use, conveying a much larger portion of produce, merchandise and passengers than was anticipated in the outset in that distance—the remainder of the road from the Meherrin to Blakely on the Roanoke has been in the hands of contractors for some time and will probably be completed in a few months,—so that in the course of the ensuing fall, we may fairly calculate on being in possession of an uninterrupted line of transportation from the Roanoke to the Appomattox.

We have lately received two locomotive engines which are now alternately in operation to Belfield, and back again the same day, generally with heavy trains of cars and coaches.

So far the prospect seems favorable, and strongly tends to confirm the original expectations of the community, and gives assurance that the laudable zeal in which this enterprise originated will be rewarded."

SOAP.

As this is the season of the year when most of our house keepers attend to making soft soap for the use of the family, we trust a few observations may be acceptable.

Much difficulty is frequently experienced in this business, and many *vulgar errors* have been connected with it; and we have heard women declare that they believed their soap was *bewitched.* When the principles are once understood, the whole process is easy and simple. First, then, it is proper that house-keepers should know the properties of the component parts of soap.

There are two fixed alkalies used in soapmaking, viz. potash and soda. Potash is called the vegetable, and soda the mineral alkali. Either of these alkalies will unite with grease and form soaps; potash and grease make soft soap only, but soda and grease make hard soap. Both these alkalies have a strong affinity for acids—uniting with them and forming what is generally called neutral salts. Thus potash and nitric acid form saltpetre; soda and sulphuric acid form Glauber salts, and soda and muriatic acid, or spirits of salts, form common salt.

Now no woman in her senses would think of making soap of either of these salts; and yet the base of either, when separated from the acid, would form, when mixed with grease, as good soap as if they had never been united.

There is also another acid which combines with these alkalies, which will equally prevent their uniting with grease as either of the before mentioned acids—that is carbonic. Now this acid is continually floating in the atmosphere unseen, and will combine with potash or soda whenever it comes in contact, forming a carbonate of soda or potash—neither of which will unite with grease to form soap.

Much of the difficulty which housekeepers meet with in soap-making, arises from their ley having become more or less saturated with carbonic acid. Ashes which have laid long in a damp place, or become damp by any other means, will absorb carbonic acid, or if the ley is allowed to stand too long after it is leached in an open vessel, the same thing will take place. Lime is often placed in the bottom of the leach, and but few can tell why they do it. If the question is asked, the reply is—because it makes the ley cleaner. Lime has a stronger affinity for carbonic acid than potash has, and of course will separate it from it. Common limestone is lime and carbonic acid: when limestone is burned in a kiln, the carbonic acid is separated by heat, and quicklime is formed. Now if this quick or fresh-burnt lime is placed in the bottom of the leach and the ley made to pass through it, it becomes purified from the acid, and the only thing neeessary then to have it unite with grease, is to have it of sufficient strength.—This may be ascertained by its specific gravity--to learn which, put a new-laid egg into it: if the egg floats, the ley is strong enough, if it sinks, the ley must either be evaporated by boiling, or by again leaching it through ashes. The grease made use of is the refuse fat of animals, and before it is united with the ley, should be freed from all the salt by boiling it in water. The quantity necessary for a barrel of good soap is about sixteen pounds, or half a pound to a gallon.

Soap when well made, should be thick and salve-like, capable of being spread thin upon cloth without flaxing or rolling off. If to such a soap about an equal quantity of soft water is added, the soap becomes hard and liver-like, capable of being taken up in the hand. This many think is

desirable,—especially the soap-boilers who make it for sale, as they make double the profit they would on the other quality.

Some housekeepers practise making their own hard soap. This is done by adding salt to the soap after it is well made, while it is yet boiling. The effect is thus explained. Salt is soda and muriatic acid. Potash has a stronger affinity for muriatic acid than soda has, and when they come in contact, as in this case, the potash decomposes the salt and combines with the muriatic acid, forming a muriate of potash—leaving the soda pure to form a hard soap with the grease: The muriate of potash will be found, on cooling, in solution at the bottom, being of greater specific gravity than the soap. The salt should be added by small quantities until the separation takes place, which may be known by the soap becoming curdled; after which it should be allowed to stand until cold, when it may be cut into bars or cakes, as suits the operator. Many suppose that resin is necessary to harden the soap. This is not the case; it is used as a matter of profit—not of necessity.

The common yellow color of soft soap is owing to the iron contained in it, as the oxide of iron is dissolved by potash. Where white soap is desirable, it may be made by substituting pearl-ash or carbonate of potash, and abstracting the carbonic acid by lime—and by using lard or other white grease, the purest white soap may be made—[*Genesee Farmer.*

RAIL ROADS AND CANALS.

From the Alexandria Gazette of Feb. 7.

No subject can be more interesting to our readers than that of Internal Improvements, and the inventions which have recently been brought into use, to facilitate trade and commerce and intercommunication. Hence, we are always studious to collect and arrange facts having a bearing upon these matters for their use and information.

A few years only are passed since the wonders performed on rail roads were regarded as mere Travellers' Tales. Now, at our own doors nearly, we may see them realized. In point of velocity and burthen, the locomotives have proved capable of more than was at first asserted. In our day, too, we have the wonders of increased and extraordinary velocity on canals, which would not once have been believed, and against which the trials on the Delaware and Chesapeake canal have been cited. On this subject, however, we have been favored with a pamphlet, published in England, which contains so much that is really important, and to us deeply interesting, that we will take the present opportunity to copy some of its pages, regretting that our limits only allow us to make extracts:

"The Liverpool and Manchester railway company in their competition with the water carriage, have obtained but a very trifling proportion of traffic from the canals. The profits (if any have actually been made by the carriage of goods on the Liverpool and Manchester railway) are extremely small; yet the water distance between Manchester and Liverpool is nearly double the railway distance; and instead of possessing the regularity of canal conveyance, is, for eighteen miles of this additional length, subject to the winds and tides of the Mersey. Nevertheless, of an amount of nearly fourteen hundred thousand tons annually, for the carriage of which the directors of the Liverpool Railway were desirous to provide, before their railway was opened, little more than an eighteenth part, including the entire road traffic, has been as yet obtained for the Railway; and the expenses of carrying this fraction of the trade, have been so enormous, as to make it doubtful whether the railway company do not suffer a regular loss on their carrying trade, which is defrayed from their profits as coach-masters."—[*Note B—Appendix.*]

"However incredible it may appear, it is certain that canal passengers can be carried at a speed of ten miles an hour, with a degree of ease, comfort, and safety, such as no other conveyance can give, and at a charge if required by competition not much more than a tenth of the cost of railway travelling.

"These facts, so different from general belief, have been completely ascertained during the course of the last two years. They are consequent on the detection, by practice and experience, of two fallacies which had been held out to the public, and received as undoubted truths.

"The first of these fallacies was, that it was impossible to propel a boat, carrying any considerable number of passengers, along a canal at a high speed without incurring an enormous expenditure of money and power, and without occasioning a wave or surge which would wash down the canal banks.—[*Note C—Appendix.*]

"The second fallacy was promulgated by certain engineers, connected with railway projects, and is as follows, viz: that in proportion as the speed on a railway was increased, the expense of conveyance was diminished; as the engines by doubling their speed could in the same time do double work.—[*Note C—Appendix.*]

"Now the first fallacy, viz; the alledged impossibility of moving at a great velocity through canals, and the certainty of the destruction of the canal banks by the swift passage of canal vessels, have been proved to exist in imagination only. A speed of ten miles an hour has for the last two years been maintained, in the carriage of passengers on one of the narrowest canals in Britain, without raising a ripple on the banks, even where the vessel carried upwards of one hundred passengers, or as many as are carried in a train of coaches on the Liverpool and Manchester railway.

"The expenses or cost of obtaining this speed are so trifling, that the fares per mile are in these quick boats just one half and one third of the fares in the Liverpool railway coaches, while at these low fares the profits are such as have induced the boat proprietors to quadruple the number of boats on the canal.

"On the other hand, and in respect of the second fallacy, although it be true that the extraordinary velocities obtained on the Liverpool railway have fully come up to the expectations of the projectors, yet the expenses, instead of being diminished, (according to the dicta promulgated by engineers,) have been enormously increased, and have gone so far beyond all previous calculation, as to make it doubtful whether the railway company will not ultimately find, that agreeably to an Irish phrase, 'they have gained a loss.'

"As respects canals, the experiments of great velocity have been tried and proved on the nar-

rowest, shallowest, and most curved canal in Scotland, viz: the Ardrossan or Paisley canal, connecting the city of Glasgow with the town of Paisley and village of Johnstone, a distance of twelve miles. The result has disproved every previous theory as to the difficulty and expense of attaining great velocities on canals; and as to the danger of damage to the banks of canals by great velocity in moving vessels along them.

"The ordinary speed for the conveyance of passengers on the Ardrossan canal, has for nearly two years been from nine to ten miles an hour, and although there are fourteen journeys along the canal per day, at this rapid speed, the banks of the canal have sustained no injury, indeed injury is impossible, as there is no surge. The boats are formed seventy feet in length, about five feet six inches broad, and, but for the extreme narrowness of the canal, might be made broader; they carry easily from seventy to eighty passengers, and when required, can, and have carried, upwards of 110 passengers. The entire cost of a boat and fittings up, is about £125. The hulls are formed of light iron plates and ribs, and the covering is of wood and light oiled cloth. They are more airy, light and comfortable than any coach, they permit the passengers to move about from the outer to the inner cabin, and the fares per mile are one penny in the first, and three farthings in the second cabin. The passengers are all carried under cover, having the privilege also of an uncovered space. These boats are drawn by two horses, (the prices of which may be from £50 to £60 per pair) in stages of four miles in length, which are done in from twenty-two to twenty-five minutes, including stoppages to let out and take in passengers, each set of horses doing three or four stages alternately each day. In fact, the boats are drawn through this narrow and shallow canal, at a velocity which many celebrated engineers had demonstrated, and which the public believed to be impossible.

"The entire amount of the whole expenses of attendants and horses, and of running one of these boats four trips of twelve miles each, (the length of the canal,) or forty-eight miles daily, including interest on the capital, and twenty per cent. laid aside annually for replacement of the boats, or loss on the capital therein invested, and a considerable sum laid aside for accidents, and replacement of the horses, is £700 some odd shillings, or taking the number of working days to be 312 annually, something under £2. 4*s.* 3*d.* per day, or about eleven pence per mile. The actual cost of carrying from eighty to one hundred persons a distance of thirty miles (the length of the Liverpool railway,) at a velocity of nearly ten miles an hour, on the Paisley canal, one of the most curved, narrow, and shallow canals in Britain, is therefore just £1. 7*s.* 6*d.* sterling. Such are the facts, and incredible as they may appear, they are facts which no one who inquires, can possibly doubt.

"As respects railways, the experiment of high velocities has been made, and the result ascertained on the best finished, and finest line of railway in Britain, connecting the two great towns of Liverpool and Manchester, without a single curve, from end to end, and with only two short ascents.

"The result of this experiment on the Liverpool railway has been somewhat different from that on the Ardrossan canal. On the railway, indeed, the expected velocities have been fully attained, and the calculations of the engineer, in this respect, satisfactorily demonstrated as possible and correct; but unluckily one very important matter had not been admitted into the calculation, or rather had not been supposed to exist, viz—the probability, or rather certainty, of a great increase of expense, consequent on increased speed. The geometrical ratio of increased resistance on increasing the speed on canals, has been transferred to the increase of expense on increasing the speed on railways, with this addition, that the increase of expense affects not merely the moving power, or locomotive engine, but the coaches, wagons and roadway. The ordinary speed of conveyance on the Liverpool railway, is from ten to twenty miles an hour, and depends much on the weather and the weight dragged. The railway engine, with its tender for carrying coke and water, costs about £1000, and drags after it a train of eight coaches, the cost of each of which, if the same as in the estimate for the London and Birmingham railway, should be £200; or a train of first-class coaches with accompanying engine and tender, costs £2600. The coaches accommodate one hundred and twenty passengers. There are other coaches, and also uncovered wagons, which travel at an inferior speed, and which will cost less. The fares are various; seven shillings, or nearly three pence per mile, for each passenger, in the common coaches, of what is called the 'first train,' being just double and triple the boat fares; and four shillings in the coaches, and three shillings and sixpence in the uncovered wagons in what is called the 'second train,' which move at a lower velocity. The lowest railway fare to the traveller is therefore three half-pence per mile, in an open, uncovered wagon, moving at an inferior speed, exposed to wind and rain, and the steam and smoke of the engine—or double the fare on the Paisley canal, for being carried in a comfortable cabin under cover."

"The Paisley canal boats have now been at work plying on the canal, since the autumn of 1830, and it is found that they are as easily and safely drawn at the high velocities before mentioned, during the night as during the day. The accidents on the Liverpool railway have been so frequent and so serious, as to require the notice of the directors in the reports; whilst not even the semblance of an accident has happened with the Paisley boats."

"Although I have principally confined myself to the article of passengers, yet all I have stated applies equally to the light goods now sent by the road wagons and vanes.

"With two horses it has been shown, that a weight equal to nearly eight tons in passengers, may be conveyed along a narrow and shallow canal, at a rate of nine or ten miles an hour, and at an expense of 1*d.* a mile, including every outlay, with interest and replacement of capital, being less than one-third of the bare cost for conveyance of a similar weight on a railway.

[*Note B—Appendix.*]

The entire trade contemplated by the directors, previous to the railway being opened, and for which they wished to provide means of conveyance between Liverpool and Manchester, was 1,248,000 tons; but the entire amount obtained in the year 1831, was 88,099 tons, of which 52,224

tons were carried in the last six months of 1831. The expense of carriage of these 52,224 tons, was £21,811 4s. 10d. so that if the entire amount of anticipated trade on the railway had been obtained, the actual annual outlay on the goods trade alone would have amounted to nearly £500,000 sterling, besides all the coaching disbursements, a sum far beyond the original estimated cost of the railway itself.

[*Note C—Appendix.*]

The last scientific work I am aware of, in which these fallacies, propositions, or data, are demonstrated to be true, is Mr. Wood of Killingsworth's book on railways. This book was republished about six months after the Liverpool railway was opened; and it is there demonstrated that it would take upwards of seventy horses to do on a canal what is now actually done every day on the Paisley canal, by two horses; while it is in like manner demonstrated that the conveyance on the Liverpool railway was costing one-ninth of the amount, which, at the end of the year, it was found to have done!

[*Extracts from the Editor's Correspondence.*]

MANURE APPLIED TO THE SURFACE.

[The first of the following extracts are from letters in answer to inquiries made of Mr. Sampson with regard to the novel mode of applying manure, which we had heard was sanctioned by his judgment and experience, and which was said to be fast gaining ground among his neighbors. The name of no individual could be presented that would be considered as better authority for the merits of any doubtful practice.

A similar application of manure, but in a partially rotted state, to corn, after planting the crop, has been extensively used on the borders of the Rappahannock. We would be glad to receive an accurate account of the practice, and its supposed advantages and disadvantages. If either or both of these modes of applying manure are only *equal* in benefit to ploughing it under, they offer to the farmer an immense advantage in the greater choice and length of time for manuring.—[*Ed. Farm. Reg.*

Dover, Goochland, Jan. 31st, 1833.

* * * * * * * *

The surface manuring mentioned by my neighbor Col. W. has become very much the practice in this section of country. I have myself applied my manure mainly in that way for several years past, and with good effects. I have also selected my wheat fields as the most advantageous application of the manure, that is, for the benefit of both wheat and clover, as my wheat fields are uniformly sown down with clover seed. I have ascertained satisfactorily from practice, that land of *inferior grade* will be better taken with clover with a light application of manure on the surface, than land *much better* without it: nor have I any doubt but that it is the best practice, if wheat alone is the object. My practice for the application of the manure has been, to be well prepared with teams and tools for the speedy hauling when the land is frozen, in order that no injury may be done the wheat. The spreading may be done at almost any time, provided you do not let it remain long enough to bleach or injure the wheat. I am well assured that the best application that can be made of manure is on the surface, for both wheat and clover; and through the agency of the clover, I would say the best for the land. I have no doubt that it my be extended doubly as far, advantageously. I also consider wheat straw worth more on the surface than any other application of it: indeed I use but little in any other way, and use leaves from the woods as litter for my stock yards. * * * * Yours respectfully,

RICHARD SAMPSON.

[The age and condition of the manure not having been distinctly stated, farther inquiries were made on those points, which were answered as follows.]

February 23d, 1833.

* * * * * *

With respect to my practice with the use of manure, it varies somewhat according to circumstances, having such a variety of soils, and the condition in which the land is found varying from the actual gullied and galled state, to all the grades of naturally good and mean land. It suffices to say, that when a piece of land is intended for cultivation, which is entirely exhausted, gullied or galled, the first process would be to give it a more even surface by ploughing in and levelling gullies, &c. When this is done, I litter freely, for the purpose of turning in with the plough; leaves from the woods I prefer, as they are more readily turned under than wheat straw, which enables me to keep more straw for applying on the surface, where I greatly prefer it. I usually plaster the litter before turning it in, say at the rate of a bushel to a bushel and a half per acre. On land thus prepared, I seed oats, but reap but little, as might be supposed. I fallow this land again, and seed wheat at the fall, when the litter thus turned in is pretty well rotted. On the wheat I top-dress lightly, and plaster again, say three pecks to a bushel per acre, which produces a saving crop of wheat, enables me to get the land well taken with clover, which I think an all important object where improvement of the soil is wished. My wheat straw I generally apply on my pasture land, twelve months, or more or less as may be convenient, before ploughing in.

The manure which I use for top-dressing is generally pretty well rotted, having been made the winter previous to using it. For instance, the manure of this winter's making, I apply the next winter, taking advantage of all leisure times with teams, &c. in spring and summer, to collect my manure from the different yards in which the different kinds of stock are kept, some of which are better than others—say, from stable yards, sheep, cattle and hog pens, from ash banks, and wood yards, together with leaves which have been heaped the winter previous in the woods. I hauled to the fields intended to be seeded with wheat, (during the summer as above mentioned,) manure from the different places named, forming heaps that will contain from thirty to fifty heavy wagon loads, as the case may require, making those deposits at the most convenient places for speedily applying them on the wheat when the land is firm, (or frozen would be preferred,) hauling alternately from all the kind enumerated, so as to form a regular layer of each, where it remains until used. I then cut it down from top to bottom as they are removing it, which mixes it in such a way as to give a due admixture of all the manures on every part on which it is applied.

Manure accumulated in the different stock yards from the commencement of winter, and remaining until midsummer or later, possibly some until fall, will not run into great heat; and should it be so disposed, the fermentation will be over before applying it on the wheat in winter. Yours respectfully. RICHARD SAMPSON.

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King William, Va.

* * * * * *

For the guinea grass roots which I send you, prepare the ground by well ploughing and harrowing: let it be rich—the richer the better, as it no doubt is a very exhausting crop. Place one of the roots horizontally, every three feet—cover lightly—cultivate as corn. The roots will soon run as to meet—but from my short experience, they had better be prevented, by taking up the runners to form new plantations; as when broad cast, I am sure it would in our climate dwindle down to ordinary product. It should be cut for horses, when about four feet high; when older, it becomes harsh. What particularly recommends it is, that when all other grasses fail from drought, this is then in full growth. Indeed so very sensitive is it, you will find if it is closely watched, that upon the slightest change to colder weather, its growth is checked; but so soon as the hot scorching sun comes out, the growth is rapid beyond description. I forgot to mention that a light dry soil suits it best.

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* * * I return the names of the few subscribers to the Register that I have been able to obtain, and wish they were more—but you might as well preach repentence to the devil, as to talk to a lumber-getter or tar-burner about farming; they have no idea of the advantages of agricultural improvement, and it is useless to say any thing to them about it. I am thoroughly convinced of the value of marl, lime, &c. and shall continue to use them. Fortunately, my small and poor farm has marl all around it, attended with the inconvenience only of its being twenty-two feet below the level of the surface, so that I have steep hills to haul up. But many persons upon ——— river, have marl on a level with their land, and yet will not use it, and curse him who first introduced it.

VEGETABLE INSTINCT.

From the New England Farmer.

Instinct is a particular disposition or tendency in a living being to embrace, without deliberation or reflection, the means of self preservation, and to perform on particular occasions, such other actions as are required by its economy, without having any preception to what end or purposes it acts, or any idea of the utility and advantage of its own operation. Climbing plants afford a curious instance of this instructive economy. Some of these having very slender stems, cannot, like most other plants, grow of themselves in a perpendicular direction; but in order to compensate for this incapacity, nature has given them the power of moving or twining their branches and tendrils different ways, until they generally meet with a tree or some other body on which to climb, to attach themselves; and when a tendril has laid hold of a support, it coils up and draws the stem after it.*

Trees and other vegetables have likewise the power of directing their roots for procuring nourishment:—for instance, a tree growing near a ditch, will be found to direct its roots straight downwards, on the side next the ditch, until they reach the ground below it, when they will throw off fibres underneath, and ramify like the root on the other side of the tree. Some curious examples of this kind of instinct are related by Lord Kaimes, among which is the following:—"A quantity of fine compost for flowers happened to be laid at the foot of a full grown elm, where it lay neglected three or four years; when moved in order to be carried off, a net work of elm fibres spread through the whole heap; and no fibres had before appeared at the surface of the ground."

Many flowers also fold up their leaves on the approach of fall or in cold cloudy weather, and unfold them again when cheered by the reanimating influence of the sun. This is remarkably exemplified in the *convolvulus arvensis*, *anagallis arvensis*, and many others, but more frequently in the last, whence it has been called the poor man's weather glass.

In Watson's Chemical Essays, also, it is stated that trefoil, wood sorrel, mountain ebony, the African marigold, and many others, are so regular in folding up their leaves before rainy weather, that these motions have been considered as a kind of instinct similar to that of ants.—*Tupper on the Probability of Sensation in Vegetables.*

Some plants open their petals to receive rain, others avoid it; some contract at the approach of a storm, others at the approach of night; while some expand and blossom only to the evening air.

Near the Cape certain flowers form a species of chronometer. The *morea unguiculata* and *undulata* open at nine in the morning and close at four; the *ixia cinnamonea* opens at the time the other closes, and sheds a delicious perfume throughout the night.

The stamina of the flowers of sorrel thorn are so peculiarly irritable, that when touched, they will incline almost two inches, and the upper joint of the leaf of the *dionæa* is formed like a machine to catch food. When an insect therefore settles on its glands, the tender part becomes irritated, and the two lobes rise up, grasp the insect and crush it to death. The plane tree exhibits the power of exercising a sagacity for securing food not unworthy of an animal. Lord Kaimes relates, that among the ruins of New Abbey, in the county of Galloway, there grew in his time, on the top of one of its walls, a plane tree upwards of twenty feet in height. Thus situated, it became straitened for food and moisture, and therefore gradually directed its roots down the side of the wall, till they reached the ground at the distance of ten feet. When they had succeeded in this attempt, the upper roots no longer shot out fibres, but united in one; and shoots vigorously sprung up from the root which had succeeded in reaching the earth.

The island of St. Lucia presents a still more curious phenomenon in the animal flower. This organization lives in a large basin, the water of which is brackish. It is more brilliant than the marigold which it resembles. But when the hand

*A mistake. The tendril does not draw the stem after it; it merely supports it. The stem increases in length only from the growth at the end. The limb of a tree and the tendril of a vine are always at the same distance from the ground.

is extended towards it, it recoils, and retires like a snail in the water. It is supposed to live on the spawn of fish.

In Java grows a plant, the *Nepenthes distillatoria*, remarkable for having a small vegetable bag attached to the base of its leaves. This bag is covered with a lid which moves on a strong fibre, answering the purpose of a hinge. When dews rise, or rains descend, the lid opens; when the bag is saturated, the lid falls and closes so tightly, that no evaporation can take place. The moisture thus imbibed, cherishes the seed, and is gradually absorbed into the body of the plant.

FUEL.

By experiments made in Philadelphia, under the direction of the American Philosophical Society, it has been satisfactorily ascertained, that by burning wood or other fuel, in our common open fire-places, we avail ourselves of only *one-tenth part of the heat produced:* the remaining nine-tenths being drawn up chimney with the current of air, or being otherwise expended and lost. While at the same time, by burning the same fuel in a common *cast iron* stove, with five and a half feet of pipe, *forty-five hundredths*, or nearly one-half of the heat produced, is rendered available. And agreeably to this calculation, one cord of wood burnt in a stove, will produce as much available heat as four and a half cords burnt in an open fire-place. The same experiments prove, that a sheet-iron stove saves, with the same length of pipe, about twenty-two hundredths more of the heat produced, than a cast iron stove. With this difference, the gain of heat is proportioned to the length of the pipe, until the pipe reaches the length of forty-two feet, at which length the entire amount of heat appears to be expended. This theory too, in its general principles is too plain to be misconceived by any one. Who does not know that if the whole amount of that which is continually pouring up the chimney, and heating it to the very top, were thrown out into the room, the difference would be very great.

The inhabitants of high northern latitudes understand this matter very well, and accordingly carry their stove pipes sometimes around the entire circumference of their rooms.—[*Ibid.*

POULTRY.

Fowls of every sort may be profitably fed on boiled potatoes and meal mixed. Hens which do not lay in winter, should have access to pounded bones, oyster shells, or some other matter which contains lime, in some of its compounds, because something of the kind is necessary to form the shells of the eggs, which are composed of the phosphate of lime.

Cobbett's Cottage Economy observes that pullets, that is, birds hatched the foregoing spring, are the best laying hens in winter. "At any rate let them not be more than two or three years old. They should be kept in a warm place, and not let out even in the day time in wet weather; for one good sound wetting will keep them back a fortnight. The dry cold, even the severest cold, if dry, is less injurious than even a little wet in winter time. If the feathers get wet, in our climate in winter, or in short days, they do not get dry for a long time; and this it is that spoils and kills many of our fowls.

"The French, who are great egg eaters, take great pains as to the food of laying hens in winter. They let them out but very little, even in their fine climate, and give them very stimulating food; barley boiled and given them warm; curds, buckwheat, (which I believe is the best thing of all, excepting curds,) parsley, and other herbs chopped fine; oats and wheat sifted; and sometimes they give them hemp seed, and the seed of nettles: or dried nettles, harvested in summer and boiled in winter. Some give them ordinary food, and once a day toasted bread sopped in wine. White cabbages chopped up are very good for all sorts of poultry."

It has been said by other writers, that poultry, as well as pigs, are much benefited by placing charcoal, broken into small pieces, in situations to which they have access. This substance, it is said, adds to the appetites, and helps the digestion of these animals; and, as it is cheap, and cannot be possibly injurious, it may be advisable to use it as a constituent for their diet.

A proportion of animal food, mixed with vegetable food, is said to cause poultry to thrive much faster than they would otherwise. If they have space to range in, where they can pick up grasshoppers and other insects, they will thrive faster. But they should for some time before they are killed for eating, be fed exclusively on food which will not have a tendency to give a bad relish to their flesh.—[*Ibid.*

ON HAY-MAKING.

To the Editor of the (London) Farmers' Journal.

June 16, 1824.

Sir,—As the season of hay-time is approaching, nay, perhaps, is actually arrived in some places, I wish, through the medium of your paper, to suggest to experimental agriculturists the making some experiments on the heating of hay, and the best modes of regulating it. I have myself made very few experiments in the matter, but the mention of those, however trifling and inconclusive, may suggest to other persons the making of such as shall be more scientific and useful. One disadvantage in the matter is, that the *apparatus* is bulky and expensive, and to be had only at one season of the year, and that for an uncertain, and, at any rate, a short and busy period.

In the year 1820, it being a very backward season, we did not begin mowing hay until July 12th, and finished on the 15th. We got up two loads of the first mowed that day. Rain came, and we got up no more till the 20th, when we got up two loads. There was rain on 21st, and we got up two loads more on the 22d, four on the 24th, and two on the 25th, which was the whole. The hay was made into a round stack, or cock. On the 29th, I put the thermometer into the stack, down a hole in which a long pole had been put for the purpose of giving some vent to the heat. It stood at 70° in the open air, and was put down 2 feet 5½ inches, when it rose to 114°. I then put it in 3 feet 8½ inches, and it rose to 122°. The hole was so hot I could not bear my hand in it; and, when I took it out, it had a sweet hay smell, and was sticky, as if with sugar or syrup. This hay, in the following winter, proved perfectly good, except a vein about the

middle, which was mouldy, where the rain had got to it, notwithstanding it had been covered with a canvass cloth, or soldier's tent. Some salt had been put in here, when fresh hay was put upon it, and the stock eat even this very well.

In the hay time of 1821 other engagements prevented my making any experiments.

In 1822, we began mowing clover on the 13th of June, and got up two loads on the 17th, on which day also we began mowing grass. On the 18th, two loads of clover; on the 19th, three loads of grass hay; 20th, two ditto; 21st, three ditto; 22d, two ditto; 24th, two ditto; 25th, one ditto; 26th, two ditto; 27th, the hay-stack, an oblong one, was trimmed up, and I put the thermometer (which stood at 70° in the open air) in, from the top, about 18 inches. After a few minutes it rose to 88°. The hole was made deeper, by putting up more hay, and I put the thermometer in about two feet, and, after a few minutes, it was at 94°; and, after a third trial, at 96°. My farming man thought the hay was as well got up, and was doing as well as hay could do. We added one load to it July 3rd, another on the 4th, and two on the 6th, and four loads of clover on the 9th. The stack was thatched on the 12th. Business prevented my making any experiments on the heat after the 27th of June. The hay turned out perfectly good.

In 1823, we began with mowing some tares on the 10th of July, and grass the next day. We did not get up any till the 17th, (there having been rain on the 11th, 12th, 13th, and 15th,) when we got up two loads; on the 22nd, one load; on the 24th, five loads. On the 30th we got up one load of tares; August 4th, three loads; and on the 5th, two loads, when we finished.

Having found in former experiments, that the thermometer fell, on feeling the cooler air, almost before I could observe it, I thought we might obtain a more permanent specimen of the heat by plunging a wide-mouthed quart bottle full of water into the hay-stack; and, accordingly, on the 27th, my man put one in about two feet deep. On the 28th, in the afternoon, the thermometer in the open air being at 60°, I put it into the hole above the bottle, and it rose to 70°. I then took out the bottle, and put the thermometer into the water, when it rose to 130°, and I could scarcely bear my finger in it. On the 29th, the thermometer being at 64° in the open air, I put it into the hole, and it rose to 74°, in the water to 130°. At the bottom of the hole, the bottle being taken out, it was at 100°. The 30th, the thermometer being 63°, it rose in the water to 129°. When it was cooled again to 80°, I put it into the hole, and it rose to 90°. This day one load of tares, very dry, was put on, which raised the stack about two feet. The bottle was put in, the bottom being nearly level with the bottom of the tares, and on the 2d of August it was scarcely warm. The stack was kept covered with the cloth at night, and when it rained, or when rain was expected; and on the 7th, in the evening, the thermometer being at 60°, on putting it into the water, it rose to 112°. On the 12th, at half past seven in the evening, the cloth having been over the stack, the thermometer being at 70°, I put it into the water, and it rose to 122°. When taken out, and cooled to 86°, I put it into the hole, and it rose to 92°. On the 13th, the cloth having been put off some hours, the thermometer being at 70°, rose in the bottle to 126.° When cooled to 76°, and being put into the hole, it rose to 85°. September the 19th, the stack was thatched, when it was still warm, warmer than new milk.

In the winter, when the hay was cut, it was mouldy in those places where we had stopped in laying on the loads, and the wet had got to it through the cloth. We had scattered salt on those places as it was made up, and the stock, on the whole, eat it well. My farming man thinks that the hay heated *well:* that it did not heat too much: and that, had it heated less, it would not have been so good. The stock, however, did not eat it like good hay, and it was not profitable in promoting milk.

These experiments are not related as models, but merely, as before stated, to *suggest* the making others on better principles. A certain degree of heat is necessary, we know, in order to bring on the *saccharine* or *sweet fermentation*, and make good hay; carried much beyond that, the *bituminous* or *pitchy fermentation* takes place, and it becomes what is called *mow-burnt*, and has little or no nourishment in it; and with a greater degree of heat it takes fire. To ascertain the point and means of attaining the first of these stages, is the desirable object. It is already customary with some to have a flue, or chimney, through the stack, to give vent to the heat, and prevent its firing. This flue is made sometimes by fixing a wooden flue upright in the middle, when the stack is begun; sometimes by fixing a long pole, and drawing it up as the stack rises in height; and sometimes a stack stuffed with straw is used for the same purpose. But I do not recollect to have seen or heard, or seen it suggested, to have flues along the bottom of the stack, to communicate with the upright one. For this purpose I would have a raised foundation, laid of brickwork, or stone, or earth, above a foot in height, with flues in it of perhaps a foot or more square; the upper part to be covered over with pieces of board, with intervals between, or with faggot wood, to prevent the hay firing. In a round stack, or cock, two flues, cutting each other at right angles in the centre, might be sufficient; but in a long stack there should be one along the middle of the length, and two or more across the shorter diameter; and where these intersect each other, the wooden or perpendicular flues should be erected. These, for the purpose of making them more portable, might be made in joints, or portions, to be put upon each other as the stack rises, and not made of whole boards, but of *slats* with spaces between; and at the ends of all the flues I would have wooden stoppers, (like the stoppers which we often see used to put into the sockets made to hold the posts for the lines to be fixed to in a ground for drying linen,) by means of which the flues could be more or less opened or closed, and the current of air regulated for regulating the heat of the hay, and might be quite stopped up when the hay had attained its proper state.

Hoping that some of your correspondents will take the subject into consideration, and give us the result, I am, sir, yours, &c. A FARMER.

There are few if any operations in rural economy less understood by us than hay-making. The process is almost every where conducted according to rules founded on former practice, but seldom have they been tested by any judicious and accurate experiments—and the partial success achieved (for the success is never

complete) is more due to chance, than to foresight and sound reasoning. The object sought in making hay (as we all know) is to dispel or evaporate the watery parts of the grass, that would produce putrefactive fermentation, but to preserve all the nutritious particles of the grass. If the operation could be perfectly performed, the dry hay would be as nourishing to beasts as the green grass from which it was made—possibly more so, by the formation of sugar, which is caused by a certain degree of fermentation in the stack. In Virginia, our almost universal error is to dry the hay too much in curing: in England, where there is so much less sun, and more rain, they are often compelled to stack their hay so little cured as to cause it to be heated injuriously, and even sometimes to take fire—a result which has perhaps never occurred in this country. The difference of climate and of other circumstances, must cause essential differences in the practices of the two countries; yet still, if haystacks in England may heat safely, and even beneficially (by producing the saccharine fermentation) to 122° or more, it must be true that an equal degree of heat would also be safe and beneficial in Virginia. The foregoing articles may at least serve to furnish useful hints on this subject, and perhaps may induce some of the readers of the Farmers' Register to make similar examinations of the degree of heat produced in their stacks of new hay.

CLOVER AND TREFOIL SEED.

From Babbage's Economy of Machinery and Manufactures.

Some years since, a mode of preparing old clover and trefoil seeds by a process called "*doctoring*," became so prevalent as to excite the attention of the House of Commons. It appeared in evidence before a committee, that the old seed of the white clover was *doctored* by first wetting it slightly, and then drying it with the fumes of burning sulphur; and that the red clover seed had its color improved by shaking it in a sack with a small quantity of indigo; but this being detected after a time, the *doctors* then used a preparation of logwood, fined by a little copperas, and sometimes by verdigris; thus at once improving the appearance of the old seed, and diminishing, if not destroying, its vegetative power already enfeebled by age. Supposing no injury had resulted to good seed so prepared, it was proved that from the improved appearance, its market price would be enhanced by this process from five to twenty-five shillings a hundred weight. But the greatest evil arose from the circumstance of these processes rendering old and worthless seed, in appearance, equal to the best. One witness tried some *doctored* seed, and found that not above one grain in a hundred grew, and that those which did vegetate died away afterwards; whilst about eighty or ninety per cent. of good seed usually grows. The seed so treated was sold to retail dealers in the country, who, of course, endeavored to purchase at the cheapest rate, and from them it got into the hands of the farmers; neither of these classes being at all capable of distinguishing the fraudulent from the genuine seed. Many cultivators, in consequence, diminished their consumption of the article; and others were obliged to pay a higher price to those who had skill to distinguish the mixed seed, and who had integrity and character to prevent them from dealing in it.

TO THE READERS AND PATRONS OF THE FARMERS' REGISTER.

When presenting the first number of the Farmers' Register, the editor solicits the attention of his readers and subscribers to a few remarks in connexion with those already offered in his proposal for publication.

Without waiting for a subscription sufficient to defray the expense of this work, arrangements were made, and obligations incurred for its commencement, and continuance for one year. Notwithstanding the general and long existing apathy manifested with regard to the improvement of agriculture in Virginia, it was not believed that a scheme promising so many advantages to the agricultural interest, would be allowed to sink for want of pecuniary support. That confidence in the farmers of Virginia was not misplaced: and the gradual increase of subscribers has already nearly removed the danger of pecuniary loss from the undertaking. The more aid that may continue to be thus given, the more useful and the more cheap will the publication be made.

But though pecuniary support is essential to the permanency and usefulness of the publication, the greatest possible aid of that kind will not compensate for a deficiency of written communication from its patrons and readers. Let enough of the latter kind of support be bestowed, and the value of the paper thereby given will command sufficient pecuniary support. One subscriber who will usefully contribute by his pen, may thus be worth as much as ten others who will furnish merely the aid of the purse.

In answer to claims of this kind it is too common for even very intelligent and successful farmers to endeavor to excuse themselves on the ground of their incompetency to appear as writers. The excuse is altogether invalid—and we must say to those of our friends who adhere to such excuses, that they will indirectly work to destroy, first the usefulness, and next the existence of this publication. It was said in our prospectus that the best farmers need information on many points, on which they could be instructed by others greatly inferior in general agricultural knowledge—and that every thinking cultivator of the soil is better informed by his experience than most other persons, on some doubtful or mistaken questions. It may be truly added that almost every such person is competent to write down his facts and opinions, and give to his fellows the benefit of his experience, in plain and intelligible language—and fine writing and "holiday terms" would be altogether misapplied to such matters. Even those of our contributors, who can have no difficulty of this kind on any subject which they may undertake to illustrate, will best serve our cause by treating on all matters of practical agriculture, in the most plain and familiar style. If all who acknowledge the truth of these observations, will shape their course accordingly, then will the Farmers' Register soon reach the highest grade of usefulness. It would serve to farmers as an *Exchange* does for merchants—an institution which would enable every individual to obtain readily any and every kind of information that any other individual is able to furnish. Whenever one of our readers

wishes to be informed on any point connected with agriculture, let him freely make the inquiry through the FARMERS' REGISTER, and let those who can, as freely answer: and if no other than this humble purpose was served by the publication, its support would directly promote the pecuniary interest of every farmer who can afford to spend five dollars a year on any thing beyond the absolute necessaries of life.

We have been the more urgent in claiming contributions from practical farmers, because in general they are the most unwilling to offer them. We hope that it is unnecessary to pursue the same course with respect to the literary and scientific subjects embraced in our prospectus. There is nothing in the list there presented that will not be valuable to our readers, and welcome to our pages, provided the discussion of the subject is confined to its connexion with agricultural science, or agricultural interests.

We shall doubly value the communications on practical agriculture that are subscribed by the real names of their authors—and we are sure that their readers generally will agree with us in that estimate. Speculative opinions, or pieces merely argumentative, require not the authority of names to give them character: they carry with them their truth and force, or their fallacy and weakness. But with regard to statements of facts and opinions founded on experience, the author's name is essential to give them currency, and to establish their value by his responsibility.

It is not from agriculturists only that we solicit contributions. Men of intelligence and observation of any profession may sometimes furnish facts or suggestions to the FARMERS' REGISTER, which will serve to aid the improvement, or promote the interests of agriculture. To the subjects of this kind already mentioned in our prospectus, many more may be added. Mechanics can aid agricultural improvement by describing new machines and implements for lessening the farmer's labor, or perfecting its object or by discussing the comparative value of those already in use. Merchants and millers may inform us of difficulties or obstructions in the sale of our products, whether caused by the fault of the individual producers, or by the operation of the laws. Lawyers might teach us how to seek relief from the many parts of our legal policy which seem to lessen the profits and oppose the improvement of agriculture. Physicians might throw much light on the intricate and important questions of the effects of cultivation, and the various processes connected with cultivation, on the climate and health of our country. Travellers in our own or a foreign land, will see and hear of many facts interesting and useful to farmers. All these and many such services may be rendered through our pages, even by writers who may be unacquainted with both the theory and practice of agriculture. We hope also to be indebted for many similar favors to the wives and daughters of our subscribers. Good housewives may offer much and various information respecting the management of the kitchen garden, dairy, culinary establishment, poultry, and every other branch of domestic economy. If we can obtain only one tenth part of the valuable contributions which even lower Virginia can supply, we have no doubt of making evident the great public utility of an agricultural journal. But without such assistance, the editor is conscious that all his individual exertions will produce but small & transient effects,

According to the views that have been presented, there can be no scarcity of matter for our pages, if there is enough zeal to induce the supply. A treatise on any branch of science, of which the truths are established and undenied, may be confined within a small compass; but the discussions, and statements of facts necessary to establish those truths, might have filled an hundred times the bulk. In agriculture, whether considered as a science or an art, almost nothing is established. Every theoretical principle, every practice is controverted, and requires farther discussion. And if every point now doubtful, could by possibility be settled, and our knowledge thereby advanced to any now conceivable degree, that advancement itself would open new subjects for controversy, and hold out new rewards for other investigations. The sources whence agricultural instruction might flow are as inexhaustible as they are numerous. *We* cannot command those fountains, and forbid their waters to stagnate in morasses, or be dried up in sands: but, if permitted, it will be our humble yet most useful labor, to draw and direct the various scattered rivulets into one great stream of improvement and fertilization.

The change of the time of our publication from weekly to monthly, will increase the value of the contents, and also permit the form of the work to be made much more convenient for use and for preservation. The change serves somewhat to lighten the labors of the editor, but at the cost of a considerable addition to the expenses of publication. As the balance of advantages from the change will be decidedly in favor of the subscribers, it is hoped that it will not be objectionable to any. By giving up the advertisements which were at first proposed, more reading matter will be given in the course of the year. A more important benefit will be found in the size of a monthly publication, permitting the largest communications and selections to be presented at once, and thus avoid those separations and continuations of articles, which so much lessen their value, as well as their interest.

To commence and exhibit at least some specimens of what we deem an important part of our proposed plan, we have engaged a gentleman who is well qualified for the undertaking, to make an examination and report of the state of agriculture, and the resources for the improvement of the soil, in some of the counties on tide water. We shall make every effort to obtain such reports from different parts of Virginia; but it is obvious that we shall not be able to effect much towards this general plan, unless aided by the zeal and labors of many other persons. Indeed, the authority and funds of the government of Virginia would be requisite to carry such a plan fully into effect; and most amply would any expense so incurred be repaid, by the exhibition of the unknown or neglected resources of our country, which would be presented by a general system of well conducted surveys, mineralogical and geological, as well as agricultural.

PROPOSAL TO PUBLISH THE FARMERS' REGISTER.

The low state of both the practice and profits of agriculture in Virginia, is admitted and deplored by all, yet adequate remedies and relief have not been proposed

and are scarcely hoped for by even the most sanguine agriculturists. Notwithstanding the counteracting effects of great improvements in practice, and the examples of successful farming that many individuals have exhibited, it is still true, that our general average products and profits have been long declining—our lands remain impoverished, and their prices have gradually sunk to rates that would not have been believed possible, if foretold fifteen or twenty years ago. Yet these results have been produced throughout a region possessing remarkable natural advantages and facilities for agricultural improvement and profit, and which promises the richest rewards for the investments and judicious employment of farming capital. Can we make no general and successful effort to improve the condition of agriculture and our country? Or, shall we expect no change unless to a worse than our present state?

The causes of the depression of agriculture in Virginia, are many—political and moral, as well as physical—all of which deserve thorough investigation, but which it would be out of place here even to enumerate. It is enough to state that every existing cause of depression is multiplied in power and effect, by the want of means for communication and concert among the members of the agricultural interest.

It is the object of the subscriber, if sufficiently aided in the attempt, to endeavor in some measure to supply this deficiency, by establishing an agricultural publication suited to our situation and wants, and which may serve, if properly employed, to exhibit to every farmer, whatever may be valuable in the practice of every other in Virginia.

The subscriber is aware of the peculiar difficulties of the editorial department of an Agricultural Journal—and he is also sensible that the habits of a practical cultivator are even opposed to the acquisition of some of the qualifications requisite for such an undertaking. No individual, however well qualified for this task, can effect much by his own unaided efforts; yet with the assistance from others, which the subscriber hopes to obtain, he believes that the FARMERS' REGISTER will serve as an efficient support to the agricultural improvement and general interest of Virginia. For the promotion of these objects through this medium, the co-operation of some among the most able to render service, has been already promised; and every means will be used to invite the aid of all who are interested in the success of the proposed plan. If our farmers can be induced to consider the Farmers' Register as simply a convenient organ through which to exchange information—by means of which any inquiry may be made, and speedily answered—and if such interchange of opinions and experience can be made as freely, and in the same plain manner that the same persons might converse if brought together—then the most important and beneficial results of such a publication will be certainly and immediately obtained. The most enlightened farmer is necessarily often ignorant of important facts, in regard to which he might be instructed by others of very inferior attainments or experience: and there is scarcely a single reflecting cultivator who has not learned some fact that is not generally known, and the communication of which would be valuable to the agricultural community. If all such *mites* of information could be drawn together and preserved, they alone would add incalculably to the existing stock of our agricultural knowledge.

The subscriber has no personal claim for aid to the proposed publication, nor does he ask it, except on the ground of its tendency to advance the individual or general interests of its patrons. Should such considerations induce the offer of sufficient patronage to insure the usefulness and permanency of the publication, arrangements will be made for its early appearance before the public: but the work will not be issued, unless in such form and manner as will not be unworthy of the coadjutors of the editor, and likely to be a full remuneration for the patronage it may obtain.

The FARMERS' REGISTER will embrace, and be limited to the following subjects:

1. Original communications of experiments, observations and opinions on agriculture, gardening, and domestic economy.
2. Selections from the best periodical publications on agriculture, European and American, and from such other agricultural works as have not been published in this country, or are not generally accessible.
3. Reviews or notices of agricultural works.
4. The discussion of such subjects of political economy as are connected with the preservation and support of the interests of agriculture.
5. Chemistry as connected with agriculture—and with the same limitation, botany, mineralogy, geology and natural history.
6. Reports of the topography, soils, minerals, peculiar manures, and actual state of agriculture of every county of Virginia, from which such information can be obtained.
7. The consideration of public improvements by roads, railways and canals.
8. Discoveries in science, or the arts, and the occurrence of other events that are considered likely to affect the interests of agriculture.

Terms.—The FARMERS' REGISTER will be published monthly, each number to consist of 64 pages of large octavo, neatly covered. The merchanical execution of the work is expected to be entirely satisfactory.

The price will be $5 a year. Payments may be made to the editor through the mail, at his risk: or may be handed to the printer.

Any person who shall hereafter procure four new subscribers, and transmit their first year's subscription, shall receive a fifth copy of the FARMERS' REGISTER for the current year, without additional charge.

All communications for publication, or on business connected with the Farmers' Register, must be addressed to Edmund Ruffin, P. M. Garysville, Va.

☞The publisher has taken the liberty of sending copies of the first number of the Farmers' Register to many gentlemen who are not subscribers, and indulges the hope that they will so dispose of them, as to make the plan and character of the work more extensively known.

CONTENTS OF FARMERS' REGISTER—No. 1.

General Description of Virginia—Discovery of Marl in a New District: Analysis of Marl from Prince Edward—Gypsum from Smyth County—Essay on Rotation of Crops—The Use of Lime in Agriculture—Memoranda, &c. of the farm of Fielding Lewis—Culture of the Vine—Grafting the White Mulberry—Birds and Insects—Oxalis Crenata—The Value of burnt Clay as Manure—Powdered Oyster Shells as Manure—Mangel Wurtzel—Worms and Rooks—Method of Attracting Rats and Mice—Specific Manures, Clover, Field Peas—Increased Product of Corn from Marling—Notice to Merchants—Agricultural Review: Slavery and Emancipation—Harvest Management—Mangel Wurtzel for Cattle—Early Gathering of Corn—Slide of Alpnach—New Power for Machinery—Petersburg Rail Road—Soap—Rail Roads and Canals—Editor's Correspondence, on Surface Manuring, Guinea Grass, &c.—Vegetable Instinct—Fuel—Poultry—Hay Making—Clover and Trefoil Seeds—To the Readers and Patrons of the Farmers' Register—Proposals to publish the Farmers' Register.